DARRACH, William (1796-1865), Philadelphia physician, the third son of Dr. William Darrach, was born in Philadelphia, June 16, 1796, at 7th, and Chestnut Sts. and was baptized by the Rev. Ashbel Green, July 17. 1796 at the Second Presbyterian Church, Philadelphia. His paternal ancestry were of Scotch-Irish descent and settled in Georgetown, Kent County, Maryland, before the Revolutionary War. His mother was the eldest daughter of Thomas Bradford and Mary Fisher. Thomas Bradford was the great grandson of William Bradford, who accompanied William Penn to Philadelphia. He was the first printer in the middle colonies and was printer to the government for many years, and later was a vestryman of Trinity Church in New York.

Dr. Darrach received his early education in Philadelphia and attended the preparatory and collegiate departments of the University of Pennsylvania. He then entered the Junior class at Nassau Hall, Princeton, where he received the degrees of A. B. and A. M. He was a student in the office of Dr. Philip Syng Physick, (q. v.) where he continued for three years. In 1818 he became resident physician to the Philadelphia Almshouse, where he was associated with Drs. Berrien, Mosely, McClelland, Gwathmey, Freeman and Beesley. While he was there a severe epidemic of typhus fever broke out and some of his notes on this disease are still preserved.

In the spring of 1819 he received the degree of Doctor of Medicine from the University of Pennsylvania. Soon afterwards he sailed for Europe where he spent three years in England, Scotland, France and Italy. Among the men he studied under were John Abernethy, Sir Benjamin Brodie, Herbert Mayo, Sir Charles Bell and Astley Cooper. He was a pupil in the Charter House Eye Infirmary and in the Lock Hospital and attended the lectures of Lawrence, Tyrrell, Babington and Gregory. In Paris he attended lectures at the Jardin des Plantes, College de France and Duplessis and L'Ecole de Medecin. He followed the clinics at the Hotel du Dieu, La Charité and L'Hôpital de St. Louis. He also studied comparative anatomy with Blainville and diseases of the skin with Alibert. In addition he received instruction in surgery from Roux, Boyer, Caffroir, Larrey and Scrapa in Italy.

After his return from Europe he started as a general practitioner and continued till the time of his death. He early became a physician to the Philadelphia Medical Dispensary, a position he maintained for several years, and was then elected its consulting physician. He was appointed physician and surgeon to the Eastern Penitentiary, the duties of which he fulfilled for ten years.

He will be remembered by cases reported to the Pathological Society of Philadelphia, and especially by his folio lithographed plates, "Drawings of the Anatomy of the Groin," Phila., 1830. The drawings were made by Chasal from dissections by Darrach while in Paris in 1820. The dissections were facilitated by forcing air into the different planes of the tissues and they were made from the standpoint of the anatomist and the surgeon interested in cutting for a strangulated hernia.

He was a member of the Philadelphia Medical Society, of the County Medical Society, the College of Physicians and of the Academy of Natural Sciences. From 1843 to 1854 he took an active part in supporting the Pennsylvania Medical College as a member of the faculty and as president for part of the time. He occupied the chair of theory and practice of medicine.

He married April 26, 1826, Margaretta Monro, the daughter of Dr. George Monro. She died in 1841. There were seven children: Dr. George Monro Darrach, Dr. James Darrach (still living in 1916 in his 89th year) and Dr. William Darrach, Jr., and four daughters. In 1845 he married Miss Gobrecht who bore him six children. He was a member and an officer in the Presbyterian Church.

He died May 6, 1865.

WILLIAM DARRACH.

DR. G. M. DARRACH DEAD

PHYSICIAN WAS 83 YEARS OLD

PIONEER IN MEDICAL PROFESSION WAS CHARTER MEMBER OF MARION COUNTY SOCIETY—DEATH COMES IN ST. LOUIS.

Eugene N. Darrach, secretary of the Interstate Car Company, received a telegram late yesterday afternoon announcing the death of his father, Dr. George Monro Darrach, at St. Louis, and left last night for that city. The news was entirely unexpected, as Dr. Darrach, though an octogenarian, had been in robust health. Death was caused by grip and complications resulting from it.

Dr. Darrach was born in Philadelphia, Feb. 20, 1827, and had just passed his eighty-third birthday. He graduated from the Pennsylvania Medical College soon after attaining his majority and came to this city in 1853. He assisted in organizing the Marion County Medical Society and was one of its charter members.

Devoted to Profession.

He engaged actively in the practice of his profession for many years and will be remembered by the older physicians as a man of generous impulses, always sympathetic with the afflicted and deeply imbued with love for his profession. Since his retirement from active practice he had been making his home with his son in this city and with another son in St. Louis, with whom he was staying when attacked by his fatal illness.

His wife, who was a daughter of John W. Hamilton, the first auditor of Marion County, died four years ago. The body will be brought here and interred at Crown Hill from the residence of E. N. Darrach, 2027 North New Jersey street.

Dr. Darrach is survived by four sons, C. S. of St. Louis, J. H. of Washington, D. C., and F. M. and E. H. Darrach of this city.

D

Dr. Geo. Morrow Davies

from Dr. Fuller

June 7/52

DRAWINGS

OF THE

ANATOMY OF THE GROIN:

WITH

ANATOMICAL REMARKS.

BY

W. DARRACH, M. D.

PROFESSOR OF THE PRINCIPLES AND PRACTICE OF MEDICINE IN THE MEDICAL DEPARTMENT OF PENNSYLVANIA COLLEGE; FELLOW OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA; ONE OF THE CONSULTING PHYSICIANS OF THE PHILADELPHIA DISPENSARY; CONSULTING PHYSICIAN OF THE EASTERN PENITENTIARY OF PENNSYLVANIA, ETC. ETC.

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TO

PHILIP S. PHYSICK, M.D.,

PROFESSOR OF ANATOMY IN THE UNIVERSITY OF PENNSVLVANIA,

AND

JAMES RUSH, M.D.,

THE FOLLOWING PAGES ARE RESPECTFULLY INSCRIBED,

AS A PUBLIC ACKNOWLEDGMENT

OF THE MANY ADVANTAGES RECEIVED FROM THEIR
PROFESSIONAL INSTRUCTION BY

THE AUTHOR.

THE SECOND EDITION

OF THIS WORK

IS DEDICATED TO THE CLASS OF THE MEDICAL DEPARTMENT

OF THE

PENNSYLVANIA COLLEGE,

OF THE

SESSION OF 1843-4.

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PREFACE.

The original drawings of this publication were executed by M. Chasal of Paris, from dissections made by the author, in the *Pavilions de l'Ecole de Medicine*, during the winter of eighteen hundred and twenty.

Those of the present edition of this work,—reduced in size,—have been executed by Mr. M. S. Weaver of Philadelphia.

It is hoped, that what is here offered will be acceptable to the profession, by its adding something to pathology, and to precision in practice; by showing the mechanical means employed in the human subject, to connect the anterior parietes of the abdomen with the lower extremities; and by furnishing some observations on points of anatomy hitherto unnoticed.

These points are,—The curvilinear pubal boundary of the subcutaneous adipous tissue, as exemplary of similar limits in other parts of this tissue :—the dissimilarity in the formation and uses of the crescentic and semilunar edges of the fascia lata :—the arrangements and mechanical uses of three fasciculi of fibres, situated on the tendon of the external oblique muscle of the abdomen :—a minute description of the external and internal abdominal rings of the muscular fasciculi about the latter, and of those belonging to the spermatic cord :—the interlacement of the tendon of the external oblique with the sartorial portion of the fascia lata :—the five layers of fibres composing the crural sheath :

—and lastly, the ligament-like process of the fascia lata, which makes the seat of stricture in crural hernia.

Of the anatomical and pathological remarks which accompany the drawings, those contained in the first and second chapters are unavoidably lengthened into digressional essays. The object of the one, is to endeavour to free the term *fascia* from the obscurity in which surgical writers have involved it: and of the other, to establish a practical distinction between the subcutaneous adipous and the subcutaneous cellular tissues; and by an analysis of the latter, to demonstrate, that the method for an easy and complete dissection, not only of the groin, but of other parts of the body—nay, of *animal structure generally*, consists in ascertaining the *arrangement* of the cellular tissue by means of inflations, and in carefully removing the laminæ in the order of that arrangement.

DRAWINGS

OF

THE ANATOMY OF THE GROIN.

WITH A FEW ANATOMICAL REMARKS.

CHAPTER I.

ON THE TERM FASCIA.

As the word *fascia* is variously used by surgical and anatomical writers, and will frequently occur in the descriptions of the plates and in the subjoined remarks, which are here respectfully offered to the medical profession, it may be properly made the subject of a few introductory observations.

Various meanings of the term. — The term *fascia* designates, in some instances, parts which differ essentially in formation and use; in other instances, it is employed in such a manner as to make an arbitrary division of the same structure;

and occasionally it is found to draw undue attention to portions of the body which can have no surgical and comparatively very little anatomical importance.

This indefinite use of the term has indirectly produced perplexity; and even dislike to the term itself. It has further brought discredit on all anatomical displays of fascia; causing them to be regarded as the artificial work of the knife, not a development of structure. Thus the subject has ceased to interest before a complete knowledge of it has been attained, and by many has been abandoned as unworthy of investigation. There is a fascial system, however, which may be traced as distinctly as the serous or mucous system, and the knowledge of which is in many respects important.

Fascia superficialis.—The phrase *fascia superficialis* refers to no part of this fascial system. It means only the subcutaneous cellular tissue, situated on the abdomen and upper part of the thigh. In inguinal hernia, the protruded bowel carries before it the cellular tissue, situated underneath the tendon of the external oblique muscle; and having arrived at the abdominal ring, carries also before it the cellular tissue, (or fascia super-

ficialis) situated on the outer surface of the same tendon. A second sac is thus formed on the protruded bowel exterior to that made by the peritoneum. This outer sac is inaccurately said to be formed by the fascia superficialis. It consists of this, and the cellular sheath of the spermatic cord. The term *fascia* has thus, for surgical purposes, been applied to cellular tissue, compacted and thickened by disease and mechanical pressure.

Fascia propria.—In a like sense is used the phrase *fascia propria.*

The tumour of crural hernia is also found to have, very generally, a sac outside that of the peritoneum. This is said to be made of the "*fascia propria,*" that is, of the condensed and protruded cellular tissue, situated on the outside of the peritoneum, between this and the fascia transversalis.

Origin of the above phrases.—The term, as above employed, has no anatomical signification. Fascia superficialis and fascia propria are surgical phrases, given to internal and external abdominal portions of the extensive cellular system, in order to facilitate a description of hernial sacs, into

the formation of which these portions partially enter, and by being compacted, &c. in old cases of hernia, have become important membranes.

Fascial system.—A very different meaning is to be attached to the word *fascia* in the expressions, fascia lata, fascia iliaca, fascia transversalis. In these and many other instances the word *fascia* designates a fibrous membrane.

Extension of the term.—The term may be extended also to parts having other names, such as aponeurosis plantaris and palmaris, the crural sheath and the fibrous channels of veins. All these are but parts of the same fascial system, and have radically the same structure.

Structure of the fascial system.—The structure of the fascial system is essentially that of parallel inelastic shining fibres, united by cellular tissue and unconnected with muscularity.

Fascia, in some places, consists of cellular membrane strengthened and rendered less elastic by a few of the above mentioned fibres, which traverse the laminæ in parallel lines: this is true of the upper part of the fascia iliaca. In other places (the back part of the thigh for example) it resembles such tissues as the dura mater and sclerotica

From these, however, it essentially differs in its organization.

Difference between fascia and dura mater, &c.—The dura mater is composed of an outer layer of opake, whitish, non-fibrous matter, and an inner layer having a polished surface; fibres are found only irregularly distributed on the falx and tentorium. The sclerotica consists of an interlacement of fibres. But the strong fibrous portions of the fascial system have the same structure as the more delicate cellular parts. The fibres are parallel, inelastic and shining. The difference in strength and thickness, arises exclusively from the assemblage of the fibres being closer, and the number of their layers being increased. The fibres of the different layers, whether two or more, decussate each other; but in no instance do they interlace.

Elements of fascia.—The fascial system is then composed of two elements, of opposite properties. The cellular tissue, which is the bond of union of the fibres, possesses the power of dilatation and contraction; or in other words, elasticity and contractility: whilst the shining fibre is, like tendon or ligament, destitute of these qualities. As therefore,

the one or other of these ingredients predominates, it will modify the character of the structure, permitting it to be elastic and contractile when the fibres are few, and making it unyielding when they abound; more so in that case, in which the fibres are in close contact and in several layers. A membrane is thus formed, well suited to facilitate, increase, and direct the action of muscles, protect the large arteries, veins and nerves in the extremities, and to furnish a secure medium of attachment between the extremities and the trunk, in addition to that made by the ligament of the joints.

The different parts of the fascial system will be found variously modified by their localities and connections. Nevertheless, if the phrase may be allowed, the parallel uninterlaced, inelastic shining fibrous structure is its uniform generic character. This is equally true of the lower orders of animals as of man.

Fascia iliaca.—The fascia iliaca, at the origin of the iliac muscle, is a delicate transparent membrane, separable into laminæ, between which are frequently found layers of fat: these laminæ are only distinguishable from mere cellular tissue,

by their unyielding aponeurotic fibres, which traverse the laminæ in parallel lines to give strength to the membrane, and render it proportionably inelastic.

Fascia lata.—The fascia lata, on the contrary, is a thick opaque membrane, especially on the back of the thigh, where it is very dense and unyielding.

These two membranes are part of the same tissue. The apparent difference of structure depends on the greater or less quantity of the aponeurotic fibres.

The fascia lata deserves more notice. It consists of several layers of parallel aponeurotic fibres, which decussate at various angles without interlacing. The most superficial of these layers encircles the entire limb horizontally: at the inside of the knee, and at the line of separation of the extensors and flexors of the thigh, it is detached from the deeper layers; to preserve, in the one instance, the proper relative position of the two great masses of crural muscles, and in the other, to counteract the tendency to separation in the hamstrings when the leg is extended. The fibres of this superficial layer are found also at the inside of the knee, in union with the diverging tendon of

the sartorius; forming with it, an external fibrous covering of the joint. Above the knee they constitute the fascial covering of the vastus internus, and by passing over the vena saphena contribute to form its fibrous sheath or channel. Higher up the thigh, where this vein is more anteriorly situated, these superficial fibres pass under the vessel, and become the fascial covering of the sartorius. This muscle is contained in a sheath of its own.

From the above description it appears that this *superficial* layer of the fascia lata is a common envelope to the thigh; and if the examination be extended to the leg, it will here be found to serve the same purpose. The most comprehensive view to be taken of this layer of unyielding fibres is, that they are bands or strings, so applied from the hip to the ankle, as to make a common bond of union for all the parts of the lower extremity.

Ligamentous disposition of fascia.—The *internal* layers of the fascia lata, unlike the above, are limited in their use and extent. They are spread over the extensors and flexors of the thigh, to form their proper sheaths; and they make, by means of a sygmoid flexion, a ligamentous attachment to the pubis.

Fascia is also elsewhere arranged in the form of ligaments. From the aponeurosis plantaris, which is a part of the system under consideration, two separate portions pass off, to be attached to the metatarsal bone of the great toe; other portions pass from the anterior part of the aponeurosis, to be bound about the roots of the front tarsal bones. A similar ligamentous disposition is to be found in the palm of the hand.

Fibres reflected from the fascia.—Fascia, in some parts of the body, has some of its fibres reflected off at several points of its external surface. This is generally the case in every part of the posterior half of the body; more remarkably on the back part of the thighs. As the fascia superficialis is absent here, the derm and the fibrous fascia are separated only by a stratum of adipous matter. Through this stratum a tissue of strong fibres traverses, passing into the fascia below, and into the derm above, so as firmly to connect the integuments with the proper covering of the muscles. The external surface of the aponeurosis plantaris above noticed, exhibits the same arrangement.

Abrupt termination of fibres.—Fascia presents

an instance of an abrupt termination of its fibres at the origin of the pectoralis minor. This muscle, and the exposed intercostals are covered with the same fascia; on the intercostals it is strong and fibrous: it preserves this character on the pectoral to a limited extent from its origin; there it becomes a delicate transparent membrane, and nearer the axilla is nothing else than the loose cellular tissue which every where enters into the substance of muscle.

Apparent irregularity of fibres.—In that portion of the fascia of the pelvis, which passes off from the covering of the obturator internus to the sides of the bladder, described by Colles, there is an apparent irregularity in the direction of the fibres—seemingly an interlacement. This is owing to an addition of small tendons, belonging to some muscular fasciculi of the levator ani, which adhere to its under surface. They are no part of the fascia. The appearance of irregularity, here produced by them, may be elsewhere seen, and arises likewise from the addition of extraneous fibres. The structure of fascia, we repeat, is universally that of parallel fibres.

Septa.—Throughout the muscular system, septa

will be found given off from the inner surface of the enveloping fascia, so as to separate muscles, or sets of muscles, and encase them in sheaths. Such is the thick membrane, which originates from the linea aspera of the os femoris; and that which insulates the perineal muscles. In some instances the fascial sheath of the muscle is formed without the intervention of these septa; as in that of the sartorius.

Substitute for bony attachment.—Fascia, in some places, is but a surface for muscular attachment, in the place of bone. All the interosseous ligaments, and the membrane which is found in the foramen ovale of the pelvis, are examples in point.

Fascia of the gluteus maximus.—The gluteus maximus presents a peculiarity of arrangement which deserves separate notice. The fascia, although comparatively very delicate, is rendered capable of resisting the powerful actions of this muscle by means of its connections with the integuments, and the numerous septa which it sends off from its under surface. This muscle, without its admirably disposed fascia, would be an unwieldy mass of flesh, ill suited for its im-

portant actions. The external surface of the fascia of the gluteus is so connected with the adipous structure and thereby with the derm, that the integuments are made to co-operate in its purposes. The internal surface, by its septa, so divides the gluteus into an assemblage of small muscles, and so insulates each of them, that not only more power is bestowed on the entire muscular mass, but also a *thick* fibrous covering is rendered thereby useless.

Fascia of the deltoid.—The deltoid illustrates the same admirable economy. This muscle has, in a great degree, the same relation to the upper extremity, that the gluteus maximus has to the lower. For many reasons, it should be powerful yet small; which objects are accomplished in the following happy manner. The muscular mass is separated into two assemblages of small muscles: one of which has its origin from the humerus, and its insertions on the clavicle, and the spine of the scapula; the other takes its origin from the intermediate spaces on these bones, and, passing down between the former, dips its small tendons under their origins, and makes insertions. A sort of dove-tailing is thus produced. This arrangement

alone increases the aggregate power of the muscle; and, by one assemblage counteracting the other, directs this power upon the joint, and with greater uniformity: but when each small portion has a lateral resisting surface afforded by a fascial sheath, the power of the deltoid must be yet more augmented.

Semilunar edges.—Semilunar edges are occasionally found in fascia. One may be found in the deep seated fascia which covers the triceps adductor femoris, at the spot where the profundus passes off from the femoral artery to enter this mass of muscles. Another is to be seen in the axilla formed by the humeral fascia, where the inner superficial vein joins the subclavian. And a third, which has been made the subject of much surgical controversy, exists in the fascia lata where the vena saphena unites itself to the great femoral vein. They appear to be altogether subservient to blood vessels. Without them it is difficult to understand, how large arterial branches can obtain a safe ingress to the muscular masses which are enveloped in fascial sheaths, and also how the common trunk of the superficial veins can form a union with the great venous trunks of the extremi-

ties. The crural semilunar edge, though identically the same formation with the two mentioned, and others which may be found in the fascial system, presents a different appearance to a superficial observer, owing to its vicinity to a crescentic edge above it in the same fascia. This last should not be confounded with the semilunar edge, as it results from a different cause, and serves a different end. It arises from a sygmoid twist or flexion which the fascia lata makes in forming itself into a ligament, to be inserted into the side of the pubis, below the attachment of the reflected portion of the tendon of the external oblique muscle of the abdomen.

Conclusion.—It appears from this partial and desultory glance at various parts of the fascial system, that the modifications of it are very numerous. They are nevertheless identified in structure and use, and distinguished every where, by the shining, inelastic, parallel fibres unconnected with muscularity. It would be difficult to form a definition equally comprehensive and accurate. Some portions of the system may be said to be cellular membrane traversed in parallel lines by the fibres above noticed; whilst other portions

may be defined—an assemblage of these parallel fibres in one or more decussating layers, formed into a membrane by the intervention of cellular tissue. But, under all modifications, they are the attendants of muscles; to protect them—and to facilitate, increase, and, in a degree, direct their power.

CHAPTER II.

DESCRIPTION OF PLATE I.

This plate exhibits, on the right side of the subject, the derm reflected from the abdomen, penis and scrotum, upon the thigh, to display the subcutaneous adipous tissue; and, on the left side, this adipous tissue, also reflected, to display the subjacent laminated cellular tissue, called "fascia superficialis."

A A The reflected derm dissected from the abdomen, penis and scrotum.

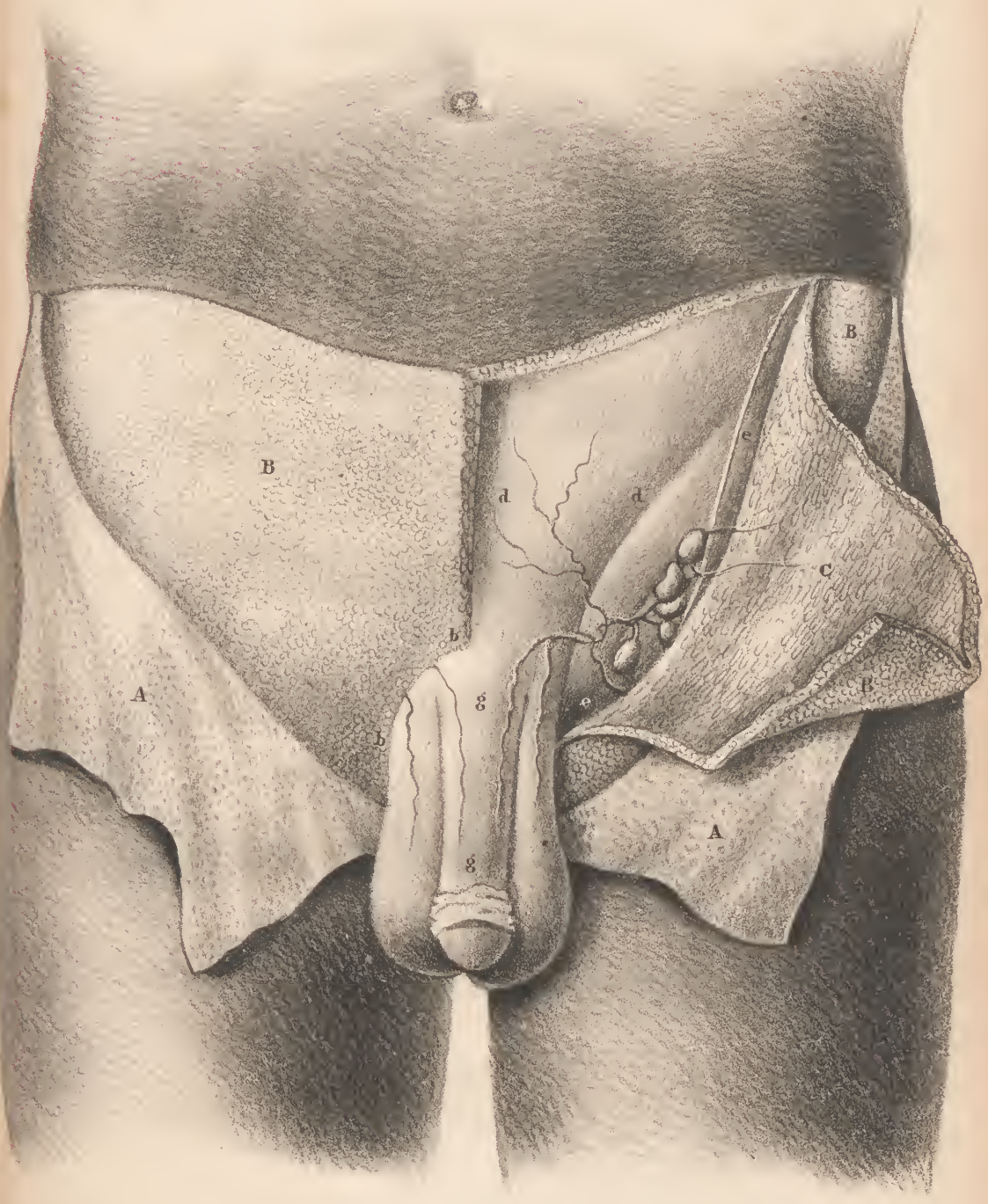
B The subcutaneous adipous tissue spread over the groin and thigh.

b b b The right portion of the curvilinear pubal edge of the abdominal subcutaneous adipous tissue.

C The reflected subcutaneous adipous tissue of the left side.

d d The abdominal portion of the laminated cellular tissue of the integuments, called by surgical writers, fascia superficialis.

Plate I.



M.S. Weaver del.

T. Sinclair's Lith.

c c The crural portion of the same tissue.

f f f f g g The genital portion of it, found, unlike the two other portions, in immediate contact with the derm, never covered with the adipous tissue: f f f f the scrotal, g g the prepucial portion.

SECTION I.

THE ADIPOUS AND CELLULAR TISSUES OF THE INTEGUMENTS.

The adipous and cellular tissues of the integuments are essentially different parts of the body; being unlike in their location, structure and uses.

THE SUBCUTANEOUS ADIPOUS TISSUE.

Location.—The adipous tissue of the integuments, a small portion of which is displayed under B, in Plate I. is found in immediate contact with the derm, in every part of the body, except the penis and scrotum, (as shown in Plate I.) the external parts of the female organs of generations, the perineum, the axillæ, and the eye-lids.

Quantity.—It varies in quantity. On the nates, and the soles of the feet it is most abundant:

over the ankle, knee, wrist, and elbow joints, the anterior part of the neck, and the cranium, it is spread into a thin layer. An examination and comparison of the different portions of the entire tissue, will show that the stratum is thicker, and more compact on the posterior than on the anterior surface of the body. The quantity varies also in respect to age, sex, temperament, and health: being greatest in infancy, in the female, particularly after her seventh climacterick, and in healthy persons of a naturally cheerful temper; and least in old age, in the male, and in individuals afflicted with chronic diseases, and with physical and mental irritability.

Structure.—This tissue consists of an assemblage of delicate transparent cysts filled with fat; and of adventitious filaments, which traverse the cysts in various directions.

The cysts of the adipous tissue.—The cysts of the adipous tissue vary in size, and shape. They are large and irregular on the abdomen: on the face they are small and spheroidal, presenting a granulated appearance. They vary also at different distances from the derm. Those in immediate contact with the derm are minute and uniform;

those in the substance of the tissue are larger; whilst those situated more interiorly, where the adipous unites with the subjacent cellular tissue, lose the distinct form of independent cysts,—these cysts being changed into irregular communicating cells containing oblong flakes of fat.

A satisfactory demonstration of these transparent cysts is easily made by an examination of the contained adipous matter, which, becoming solid at death, presents thereby a true cast of their size and shape. Their form may also be shown by a process of long maceration, which converts the fat into adipocere, and the derm into a soft gelatinous mass separable by washings. The exterior surface of the adipous tissue is thus exhibited as papillous. This appearance is owing to the projection of the outer lobules, or cysts, which, in some parts of the surface, are more or less obliquely inclined, whilst in others they are vertical, and more obtuse. These conoidal projections are, in their natural state, bedded in the derm. Its under surface is thereby filled with innumerable pits or depressions, answering to the adipous projections. This pitted surface of the derm is well exhibited by subjecting the integuments to partial

maceration and subsequently to the action of alcohol. The derm is enlarged to many times its natural thickness by the first process, and becomes hardened by the second, which, at the same time, softens and detaches the adherent adipocere. Thus are disclosed not only the conical pits of the under surface of the derm, but also the filaments of the adipous tissue; which are now to be noticed.

The filaments of the adipous tissue.—The filaments of the adipous tissue, proceeding from the under surface of the derm, traverse irregularly the interstices of the lobules of fat, or rather of their cysts, and are lost, on the anterior part of of the body, in the laminated cellular tissue, and on the posterior, where the laminated cellular tissue is wholly wanting, in the fascial system covering the muscles.

Variety of appearance.—They are modified in their nature and uses by contiguous textures. In the tissue itself they are diaphanous and membranous. At the under surface of the derm they are opaque whitish fibres, thready prolongations as it were, of the derm. At the under surface of the adipous tissue, of the abdomen, and of the anterior parts

of the extremities, they are changed into laminated cellular membrane. On the soles of the feet, the nates, the back of the thighs, and other posterior parts of the body, they are inelastic shining fibres. The first, second, and fourth of these modifications are best demonstrated by dissection of the last named parts. Here the filaments can be distinctly traced from the derm, through the adipous tissue, into the fibrous coverings of the muscles. In the substance of the thick and compact adipous tissue, they retain the transparent membranous character; when traced towards the skin, they are found to become gradually an opake dermoid matter, and in the fibrous envelop of the muscles, they are imperceptibly changed to inelastic shining fibres, reflected from that strong fascial system.

Uses of the filaments.—The filaments of the adipous tissue have several uses.

First. They are partial capsules to the cysts. These membranous sacs need such external supports; without them they would be liable, owing to their extreme tenuity, to be ruptured by the accumulation of their own secretions, viz. the contained semifluid adipous matter.

Second. They are a common bond of union

of the otherwise isolated cysts. Without them, the encysted lobules of fat would have no connexion with each other except simple contact. They would be perpetually liable to displacement; and to gravitate—like serous effusions of the cellular tissue in debilitated and dropsical persons. These filaments are found in every portion of the adipous tissue, traversing in all directions; and from them the entire structure derives its strength and continuity. Their entanglements confine the encysted lobules to their proper places, and thus enable them to give shape and proportion to the body, under all its varying postures and actions, and under all circumstances of pressure, both from within and without.

Third. They connect the adipous tissue with the contiguous textures. By them this tissue is, exteriorly, fastened to the pitted surface of the derm; and, interiorly, to the subjacent cellular tissue, or to the fascial system.

Fourth. From the above mentioned connexions, we may perceive that they are the common bond of union between the derm and the adipous and cellular tissues—the parts which in the human subject constitute that compound mass called the integuments. These several structures, having

distinct and peculiar functions, would, without the bond of the filaments, reciprocally interfere with each other, and be destitute of the aggregate character of the integuments. The nature of the connexion here described is most readily demonstrated in the nates and the sole of the foot.

Fifth. They serve the purpose of tendons. The fibres of the subcutaneous muscles of many quadrupeds have their origins and insertions in these filaments. The same is true of the platysma myoids in the human subject, and of the scattered fibres of subcutaneous sphincter muscles. Ignorance of this fact has caused the difficulty which is generally experienced in the dissection of the sphincter ani. All its fibres are curved on the coccygeal half of the anus; those more deeply seated are continued round the intestine, then decussate, and are prolonged so as to cover the bulb of the urethra: the superficial fibres, instead of going to the bulb, radiate from their curvature, and after separating into distinct fasciculi, are attached to the filaments of the adipous tissue. Another example, equally striking, of the tendinoid use of these filaments, is afforded by the outermost fibres of the orbicularis palpebræ.

The mass of this muscle terminates in a common tendon at the nose, while several exterior fasciculi, scattered from it, enter the adipous tissue and adopt its filaments as their tendons.

The filamentous insertion of the diverging fibres of the two muscles above noticed, makes their functions different from the masses whence they respectively issue. They are not properly to be regarded as sphincters, but rather as the corrugators of the integuments. The radiating wrinkles about the anus, and those of the external canthus of the eye, commonly called crow-feet, are ascribable to the action of these fibres.

Finally. It may be worth inquiry, whether these filaments may not be the medium through which the blood vessels and nerves are conveyed to the secreting cysts, the derm, and to the chorion.

THE LAMINATED CELULLAR TISSUE.

Extent.—The laminated cellular tissue of the integuments is *less extensively* spread than the adipous: it is very thin on the posterior parts of the trunk and cranium· it abounds on the anterior

surface of the thorax, abdomen, and extremities: in the eye-lids, labia pudendi, penis, scrotum, and perineum, the adipous tissue being absent, it is in immediate contact with the derm. It does not exist in the integuments of the nates, back of the thighs, palms of the hands, and soles of the feet; here the adipous tissue is alone interposed between the derm and the strong enveloping fascia of the muscles.

Structure.—This tissue has not the three-fold composition of the adipous. It consists simply of transparent laminæ, which are so connected with each other as to make communicating cells of various forms and sizes.

Properties and uses.—It possesses elasticity and contractility in a greater degree than most of the other textures of the body. By these properties it is adapted to those parts which are subject to constant motion, as the joints and neck; to those which have alternate variation in size, as the abdominal parietes; and to those which are at the same time altered in form and size, as the axilla, perineum, genital organs, and eyelids. The eye-lids, when closed, have considerable breadth, and comparatively little when open. The axilla

is a circumscribed hollow when the arm hangs by the side; but when the humerus is elevated, this hollow is changed into a plane. The perineum has only the breadth of a few lines when the thighs are closed, but when they are widely separated its breadth is very much increased. These changes are readily allowed by the yielding and restoring powers of this tissue. The penis and scrotum, more than any other parts of the body, vary at times in size and shape, and are therefore accommodated to the necessities of these wide variations, by an abundant possession of this elastic tissue.

In all these parts the adipous tissue would be unsuitable, from its want of elasticity, and from its accumulated fat.* If these parts should become fat with the other portions of the integuments, the eye-lids would be moved with difficulty or altogether closed; the arms would be cushioned out at an angle with the body, the lower limbs permanently separated, and motion in both in-

* It is not denied, that the cysts of this tissue possess elasticity and contractility, equally with the laminæ of the cellular tissue; but these properties are rendered inactive by the fat they contain and the filaments which bind them.

stances rendered difficult and awkward; nor would the presence of this adipous tissue in the genital systems be less embarrassing to the functions of these parts. A knowledge of the absence of this tissue from the labia pudendi, and perineum explains why, in the last stage of delivery, these parts—a mass of elastic tissue—readily yield to afford a passage to the head of the child, and subsequently contract their ordinary size.

The properties of the tissue under consideration render it a substitute for muscularity, where the presence of the muscle would be inconvenient, as in the scrotum. The motion of this part is commonly attributed to a subcutaneous muscle called the dartos. Since, however, few pretend to have seen this muscle; since the contraction and relaxation of the part cannot be explained on the received laws of muscularity; and further, since contractility does not belong exclusively to muscular fibre, but is found in every living animal solid, nay, in the blood itself—the gratuitous assumption of the existence of the dartos cannot be admitted. The changes of size and form in the scrotum, excited by temperature, by passion, and by a variety of other causes, depend on the contractility

of the subcutaneous cellular tissue, and not on muscularity.

Comparison of the subcutaneous-adipous and cellular tissues.—It appears from the above descriptions, that the subcutaneous-adipous and the subcutaneous-cellular tissues differ essentially from each other: the one being an assemblage of secreting cysts, lobules of fat, and connecting filaments; the other an assemblage of transparent laminæ formed into communicating cells: the former being well adapted to protect subjacent parts from contusion, and to give beauty of form by affording an uniform surface on which the skin may be smoothly stretched; the latter to promote and facilitate the motion of subjacent parts.

It appears, also, that the two tissues cannot be substituted for each other. The adipous tissue of the sole of the foot would not suit the eye-lid, nor the subdermal cellular tissue of the eyelid suit the sole of the foot. The back of the thighs, the nates, and indeed the entire posterior surface of the body, call for the compact-inelastic-adipous tissue: whilst on the anterior surface, the thorax, and abdomen being in a state of continual con-

traction and distension, and the anterior muscles of the extremities being less firmly bound by fascia, the cellular tissue becomes indispensable for facilitating their movements. And though the adipous tissue does exist on these anterior parts, its filaments have not their usual unyielding character, but assume the elastic-contractile nature of the cellular tissue.

The distinction which has thus been pointed out between the above mentioned tissues, is also demonstrated by comparative anatomy.

Fishes generally are destitute of both these subcutaneous tissues. Between the scales and the muscles nothing intervenes but a dermoid envelop.

The integuments of birds have the cellular, but not the adipous tissue.

Among the quadrupeds, swine and other pachyderm animals have the adipous and not the cellular tissue.

FASCIA SUPERFICIALIS.

The fascia superficialis, displayed on the left side of Plate I. deserves a few remarks. It is part of the subcutaneous cellular tissue.

Origin of the phrase.—The phrase fascia superficialis originated with surgical authors, in their descriptions of hernial sacs. The laminæ of the cellular tissue, which are in immediate contact with the protruded peritoneum and bowel, being, by pressure, irritation, and adhesive inflammation, so condensed and thickened as to become an *outer* or superficial sac for the protruded tumour, have been called a fascia. Thus has arisen the phrase superficial fascia, or fascia superficialis, which subsequently has not been limited to signify only the laminæ involved in the hernial tumor, but, through inadvertence, has been given to all the subcutaneous cellular tissue of the abdomen and of the anterior part of the thigh.

Disposition of its cells and laminæ.—On the subject of this misnamed portion of the cellular tissue, the following circumstances, relating to the disposition of its cells and laminæ, are worthy of notice.

Outer laminæ.—If air be forced into the cells of the outer laminæ of this fascia superficialis, at any point on the surface of the abdomen or the anterior part of the thigh, it will freely pass over the abdo-

minal, crural, genital and perineal regions; demonstrating that these regions have a *common* subcutaneous cellular covering.

Deeper seated crural laminæ.—But when air is forced into the cells of the deeper seated laminæ, its diffusion will be partial. The inflation being made from any point on the anterior part of the thigh, the air will not without the strongest effort pass above the inguinal line: the cellular tissue of the thigh will be found distended, that of the abdomen remaining collapsed. The air will force a passage by *the crural ring* into the iliac regions, thereby separating the peritoneum from the fascial covering of the iliac and psoas muscles.

Deeper seated abdominal laminæ.—Again air blown into the deeper seated laminæ, from any point on the abdomen, will also be limited by the inguinal line. It will distend the surface of the penis, together with the scrotum and perineum, without in the least affecting the thigh, nor can the air be made to pass into the crural region, even when the pressure is augmented, owing to the adherence and reflection upwards of the deeper seated abdominal laminæ at the inguinal line.

Increased pressure in this case will drive the air backward into the abdominal ring, between its edges and the subjacent uninflated cellular sheath of the spermatic cord and testicle. By this last inflation the inner surface of the tendon of the external oblique is separated from the rest of the abdominal parietes.

Cellular sheath of the spermatic cord and testicle. —The cellular sheath of the spermatic cord and testicle is a distinct portion of the fascia superficialis. This is proved by the fact, that no air passes into its cells by a forcible inflation from any of the above mentioned points: they remain collapsed beneath two distended portions of cellular tissue. This deeply seated vaginal portion may be traced up along the cord, and through the abdominal ring. From this place it diverges until it reaches the internal abdominal ring. It then enters this ring and becomes the cellular tissue between the peritoneum and the fascia transversalis and iliaca.

Air forced into it from below, completely insulates the tunica vaginalis testis, and passing along the cord, distends the diverging portion into a funnel-shaped bag. The air, having then

reached the internal ring, enters between the peritoneum and fascia transversalis, and may be made to mix with that which, in the second experiment of inflation above mentioned, passed from the thigh into the iliac region, by the way of the crural ring.

From what has been said, it is manifest that the abdominal subcutaneous portion of the cellular system—the fascia superficialis—is not an undefined mass; but that its laminæ have an orderly arrangement, which may be demonstrated by anatomical analysis: and also that what has been ascertained to be the condition of a part of this tissue, will be found to be that of the entire tissue throughout the body.

Method of dissecting the groin.—The four modes of inflation described above, point out the the method for an easy and complete dissection of the groin. For this purpose, the dissector should first inflate and remove the extensive superficial laminæ common to one side of the abdomen, half of the scrotum, the whole of the penis, and the anterior part of the thigh. He should next inflate and remove the deeper seated laminæ common to the abdomen, penis and scrotum; and after-

wards those belonging exclusively to the thigh, which communicate, however, by the *crural* ring, with the cellular tissue of the cavity of the pelvis. He should further inflate and remove the laminæ which constitute the cellular sheath of the cord and testicle, which communicate, by the *abdominal* ring, with the cellular tissue situated between the muscles of the abdomen and between the fascia transversalis and peritoneum. Finally, the dissector should remove, successively, the abdominal muscles. He will thereby make the displays of the groin which are exhibited in the drawings which accompany these remarks.

SECTION II.

PATHOLOGICAL OBSERVATIONS.

The above anatomical analysis of the adipous and cellular tissues suggests a few pathological observations.

Inflammation of the adipous tissue.—The adipous tissue, in common with the rest of the

body, is liable to inflammation, but its symptoms and progress are modified by the mechanical connexion and the vital properties of its constituent parts. These modifications of the inflammatory action are most evident in the sole of the foot, palm of the hand, the nates, and the back of the thigh. Here the structure of the tissue is most distinct, and its connexions with contiguous parts stronger and more immediate.

The structure is a compound of very dissimilar elements, consisting, as has been shown, of cysts, fat and filaments.

The *filaments* are endowed with a degree of life, analogus to that of tendon, ligament and derm; exhibiting mechanical rather than active vital properties, and though this obscure vitality renders them less liable to irritation, yet when inflamed they readily mortify and slough.

The *fat,* being only a secretion, and therefore possessing in itself no vital function, cannot, merely as a secretion, be the subject of morbid action; but it may become, if retained under some circumstances, an irritant to its enveloping cysts.

The *cysts,* unlike the two former constituents, are

organized secreting membranes, consisting of arteries, veins, absorbents, and nerves; subject to change in size, and alteration in structure; and susceptible of the adhesive, serous, and more particularly the *suppurative* inflammation.

The connexions of the subcutaneous adipous tissue with contiguous parts are, first, those made with the derm by means of innumerable dermoid filaments, and secondly, those generally made, by means of fibrous filaments, with the unyielding fascia of the muscles—in some places with, and in others without, the intervention of the laminated cellular tissue.

These connexions concur with the structure of the tissue in aggravating the ordinary inflammatory action.

The progress and symptoms of inflammation in the adipous tissue may now be satisfactorily traced.

Inflamed cysts.—When an irritant is here applied, the vascular cysts become inflamed, the fat and filaments remaining unaffected. In this state, the fat is either removed by absorption, or if retained, becomes in time, an additional irritant, and augments the inflammatory condition of the

cysts. This constitutes the first morbid state of the tissue.

Stricture.—The second state is that of *stricture.* In this state, coagulable lymph and serum are effused, blood vessels are enlarged, and the whole tissue thereby rendered full and tense. If the contiguous textures yield to this fulness, the inflamed tissue has space for enlargement; but if the contiguous textures be unyielding, presenting a thick derm on the one side, and on the other a *dense* fascia; and if also the adipous tissue between them be firmly fastened to both, at innumerable points, by traversing filaments which partake of their unyielding nature, then this tissue must be painfully and dangerously *strictured.* The stricture, practically regarded, may be said to have a double cause, viz. the derm and the filaments; the one binding the tumefied tissue, and the other acting upon it, like innumerable transverse cords passing from the derm to the fascia.

Disorganization.—The third state is that of *disorganization.* The vascular cysts are too delicate to sustain long the inflammatory action under the the aggravation from a strictured condition of the tissue. They soon mortify. The filaments, also,

from being stretched and from contiguous sympathy, become at length inflamed, and slough.

Circumscribed or extensive abscess.—The fourth state is that of *circumscribed or of extensive abscess.* The lymph, lympho-serous, serous, and sero-purulent, fluids now disappear, and give place to pus and floating shreds of sloughy matter, which are the detached mortified filaments and cysts*.

The above anatomico-pathological analysis of subcutaneous inflammation leads to the following indications and plan of treatment.

Indications and plan of treatment.—The indications in the first stage are, to remove the primary irritant, and arrest the inflammatory action. These are affected by general and local antiphlogistic measures. In the second, it is to *relieve stricture.* This is fulfilled by deep *incisions* into the derm of the affected part, more or less extensive and deep as the particular case may require. The indication in the third and fourth stages is to remove the confined pus and

* As the remarks are intentionally confined, here, to the morbid changes of the adipous tissue, nothing is said of the derm and fascia, or of the constitutional symptoms.

dead matter. This also may be accomplished by incisions through the derm. The subsequent treatment should be so directed as to arrest the suppurative tendency, promote granulations, diminish the cavity of the abcess, and establish the skinning of the openings. But the most important object to be kept in view in treating the inflammation, is the *relief of stricture.* All the other indications lead but to a palliating and "expectant" practice. This alone will remove the inflammation before it produces disorganization, abscess, and sinking of the system.

The pathology thus derived from an anatomical analysis of the integuments, when applied to the several diseases, phlegmon, anthrax, paronchia, and certain cases of phlegmonous erysipelas, will from the resemblance discoverable among them, lead to the establishment of a similar mode of treatment.

Phlegmon.—Phlegmon, properly so called, is not usually found on the scrotum, penis, labia, perineum, and eye-lids, where the subcutaneous adipous tissue is wanting. These parts, when primarily or secondarily inflamed, become œdematous. The common seat of phlegmon, that

in which it is most painful and tedious, is in the *compact* adipous tissue of the posterior surface of the body. When it occurs on the anterior surface, where the cellular tissue is united with the adipous, the inflammation is milder.

These circumstances may show that phlegmon is a disease of the subcutaneous adipous tissue and that it exhibits its genuine character when seated in those parts of this tissue which are entirely separated from the cellular tissue.

What is the nature of phlegmon? It is a circumscribed inflammation originating in the cysts of the adipous tissue, tending outward, and involving the skin. What is the cause of the extreme and continued pain? It is the stricture induced by unyielding filaments, and by the derm which binds the subjacent inflamed tissue. And what is the *core*, as it is commonly called? It is the sloughed filaments resulting from the stricture. Such is the pathology of phlegmon disclosed by anatomical analysis.

Anthrax.—Anthrax is distinguishable from phlegmon by the wider compass of inflammation, by a peculiar burning, by its mottled modena colour, and by its greater obstinacy. But, with

these differences, the two diseases are assimilated by the primary seat of inflammation in each being in the subcutaneous adipous tissue. Nor is it a slight circumstance in favour of the radical similarity in the two cases, at the same time that it serves to explain the cause of the greater severity of anthrax, that this last disease is located in the most unyielding portions of the adipous tissue. All the peculiarities of anthrax cannot however be explained by the structure of the affected part. It has indeed a character, which from the circumstances of its occurrence might be wholly ascribed to advanced age, feeble constitution and intemperate habits. Nevertheless, the binding influence of the thick derm, dense-fibrous fascia, and unyielding filaments in and about the inflamed parts, aggravates all the symptoms. A *strictured condition* will thereby be produced, and disorganization of the adipous tissue will follow ; the *cysts and filaments* being changed into *adherent sloughy shreds.*

Paronychia.—Paronychia, also, has its origin in the subcutaneous adipous tissue. This remark does not apply to that variety called paronychia maligna which has its primary seat in the parts

about the bone, and in the bone itself; nor to that seated on the outside of the derm, commonly called a runround; it includes only the cases of that variety which is familiarly named whitloe, and which is of by far the most frequent occurrence. This is an inflammation attended with insufferable throbbing pain, rapid disorganization, and profuse and extensively pervading suppuration; three circumstances, which the stricture, caused by the derm, and by the filaments of the tissue itself, superadds to simple inflammation.

Phlegmonous erysipelas.—The generic character of the above noticed complaints, belong also to certain cases of phlegmonous erysipelas.

Before these cases can be pointed out, it is necessary to abandon the commonly received definitions of this disease, as too vague;* and to

* The most recent and approved definitions are those given by Mr. Lawrence in his observations on the nature and treatment of erysipelas, read in 1827, before the Medico-Chirurgical Society of London, and subsequently published in the fourteenth volume of its Transactions. (See page 36.) One of them is in the following words :—"Erysipelas phlegmonosum, an acute iaflammation of the skin and *cellular tissue*, with firm, general and deep red swelling of the affected part, ending quickly in suppuration and sloughing."

present a new one, established on the anatomical analysis of the adipous and cellular tissues.

If it be admitted that a tissue consisting of *cysts*, *fat*, and *filaments* is different from one which consists simply of *laminæ*, disposed into communicating cells, these two tissues having also a different location, and different uses, then the phrase *cellular tissue*, in the above definition, cannot anatomically embrace in its signification both the subcutaneous *adipous* and the subcutaneous *cellular* tissues.

Mr. Lawrence's definition, viewed in this light, includes only a very few cases of the disease, viz. those situated where the integuments consist but of skin and *cellular tissue*.

The second page of the treatise alluded to, contains the following definitions: first, "phlegmonous erysipelas, the highest degree of the affection, involving the cellular and adipous *membrane*;" second, "phlegmonous erysipelas, an inflammation of the skin in conjunction with that of the subjacent adipous and cellular *tissue*."

Although the two subcutaneous tissues are specified in these definitions, yet the use of the words *membrane* and *tissue* in the singular number, shows that these tissues are not recognized as essentially different, exhibiting different symptoms when inflamed, and requiring a different treatment.

A fourth definition is implied in the following clause of page 67 of the same publication: "the subjacent adipous and cellular *textures*." This phraseology is anatomically correct. But since both the textures here named do not exist in all parts of the integuments, the extract allows a definition which will exclude those cases of phlegmonous erysipelas situated where the cellular tissue only, and those where the adipous only, are present.

ERYSIPELAS PHLEGMONOSUM IS AN ACUTE INFLAMMATION OF THE SKIN, SUBSEQUENTLY INVOLVING THAT OF THE *subdermal portion* OF THE INTEGUMENTS.

This definition has a generic character, embracing three practical varieties of phlegmonous erysipelas hitherto unnoticed; which will be described after briefly noticing the phrase subdermal portion.

The *subdermal portion* of the integuments is, according to its varied locality, cellular tissue, or adipous tissue, or a modified union of both. If, for example, it refers to certain isolated spots of the integuments, viz. the eye-lids, perineum, labia, penis, and scrotum, it consists of *cellular tissue:* if it refers to the posterior surface of the body, particularly the nates, and back of the arms and thighs, together with the palms of the hands and soles of the feet, it consists of *adipous tissue:*

It is evident, however, from the tenor of the treatise, that Mr. Lawrence did not design to limit the signification of his definitions, but, on the contrary, to extend it to all cases of the disease in whatever part of the integuments they might occur.

Such is the inaccurate anatomical character of the most commonly received definitions of phlegmonous erysipelas.

and lastly, if it refers to the anterior surface, especially to the abdomen and front of the thighs, it consists of a *modified union of both the cellular and adipous tissues.*

The three varieties of phlegmonous erysipelas thus designated are,

Cellular variety of phlegmonous erysipelas.—First. An erythema with a subjacent *serous* inflammation and tumefaction.

This variety includes cases situated on the scrotum, penis, labia, perineum, and eye-lids, where the subdermal portion of the integuments is cellular tissue; and might therefore be properly called the *cellular* variety.* Though in this tissue, suppuration and sloughing are not unfrequently the effect of inflammation, yet serum is its more usual product. This fluid pervades and and distends all the communicating cells of the tissue: whilst the derm, freed from the binding filaments of the *adipous* tissue, and being in immediate contact with the laminæ of the *cellular*

* The cases of this variety should more practically be arranged under Mr. Lawrence's second species of erysipelas, *i. e.* œdematous erysipelas. Medico-Chirurgical Transactions, Vol. XIV. page 36.

tissue, and partaking of their delicate and elastic nature, yields to the augmentation of the subjacent swelling. Thus an *unrestrained tumefaction* takes place which requires the discharge of effused fluids; and, in nowise, the removal of stricturing agents.

The deep seated erysipelas of the eye-lid affords a familiar example of this variety.*

Adipous variety of phlegmonous erysipelas.—Second. An erythema with a subjacent *phlegmonous* inflammation of a deep red colour, accompanied with tension, and ending quickly in sloughing and profuse suppuration; but without that excessive tumefaction which characterizes the *cellular* cases under the first head.

This, which may be called the *adipous* variety, from its occurring on parts where the *adipous tissue* constitutes the subdermal portion of the integuments, includes those cases of phlegmonous

* The subdermal cellular tissue of this part is also frequently affected with chronic œdema, in aged persons. The lower eye-lids in dyspeptics are often permanently bloated by effusion, into the form of semilunar sacs. The same is more or less true of the other specified isolated portions of the integuments which have no adipous tissue.

erysipelas which have the same generic character with phlegmon, anthrax, and paronychia. The resemblance of these three complaints consists in each being an inflammation of the subcutaneous adipous tissue. Now this second variety differs from them only in being *primarily* an inflammation of the skin; but this cutaneous inflammation is soon followed by that of the subjacent adipous tissue; which continues after the erythema declines, and thus becomes the principal disease, constituting the affirmed resemblance. The quick sloughing and profuse suppuration which mark this variety, are owing to the connexions and structure of the adipous tissue; and would not exist without their influence.

Cellular-adipous variety of phlegmonous erysipelas.—Third. An erythema with *phlegmonous* and *serous* inflammation. The cases of this variety are situated on the anterior surface of the body where the subdermal portion of the integuments consists of a modified union of both the cellular and adipous tissues.

Tension and tumefaction are both present in the early stage of these cases, but not to the degree in which they respectively exist in the other varieties.

In the close of the disease sloughing and suppuration take place, though less extensively than in the second variety, and always with a deep seated serous effusion.

It appears from the brief notice taken of phlegmon, anthrax, paronychia, and certain cases of phlegmonous erysipelas, first, that notwithstanding their respective peculiarities, they are all inflammations which do not of themselves subside until disorganization and sloughing have been produced: second, that they have this character from involving the adipous tissue: and third, that the injurious consequences alluded to are immediately owing to a *strictured* condition, produced in part by the filaments of this tissue itself, but mainly by the unyielding nature of the contiguous textures; for where, as on the back of the thigh, the derm is thickest, the fascia dense, and the filaments numerous and strong, interlacing the the tissue, and closely connecting it to rigid contiguous parts; there the aggravated cases of the above named diseases are to be found—particularly, the genuine cases of phlegmonous erysipelas.

Generic treatment in phlegmon, anthrax, paronychia, and phlegmonous erysipelas.—The

similitude above shown to exist among the several diseases, phlegmon, anthrax, paronychia, and certain cases of phlegmonous erysipelas, leads to a generic plan of treatment. This consists in making *incisions through the skin and subdermal portion of the integuments;* with the intention not only of emptying the blood vessels and draining off effused fluids, but principally for the purpose of removing the constriction produced by the *unyielding solids,* viz. the derm, the fascia, and the filaments.

In phlegmon, this practice should be resorted to at an early period: for since a *strictured state of the adipous tissue* exists in the first stage of the complaint, and is a principal cause of the severity of the subsequent symptoms, it should be speedily removed by one or two deep and free incisions through the derm and into the inflamed tissue. The fear of giving pain might seem to present an objection to this practice. But if the skin, the chief seat of sensation, be rapidly and dexterously divided, the pain will be inconsiderable; particularly if opium be given to lessen sensibility, and if position and pressure, when

practicable, be employed to diminish the afflux of blood to the part.

In anthrax, incisions have been recommended with a view to alter a supposed *peculiar action.* It better accords with the pathology taught above, to employ this practice to relieve aggravated tension of the inflamed adipous tissue.

In paronychia it is common to have recourse to the knife merely to remove the sequelæ of inflammation. But admitting the doctrine, that in this complaint, the derm and filaments are *stricturing an inflamed tissue,*—a deep and free incision should be made as soon as the least tension or throbbing is perceptible: by this *early* use of the knife, inflammation is arrested before disorganization and abscesses are produced.

Phlegmonous erysipelas, calls for three modes of incision, suitable to the three above specified varieties of the disease.

The first consists of numerous punctures made with a lancet into the inflamed part.

Dr. Dobson's Method.—This method originated with Dr. Dobson.* He calls it his "mode of

* See his letter to Mr. Lawrence, published in the fourteenth volume of the London Medico-Chirurgical Transactions.

abstracting blood" as a substitute for leeching. The number of punctures he advises, to use nearly his own words, varies according to the extent of the disease, but is rarely under ten, and seldom exceeds fifty; the depth of each puncture also varies according to the greater or less tumefaction of these parts: from two to four-tenths of an inch, however, he considers the proper respective depths. He repeats the punctures to the number and extent required, about twice a day, and often in bad cases three or four times. The quantity of blood which these punctures discharge, although sometimes considerable, should not create alarm, since it soon spontaneously ceases. The punctures themselves heal in a few hours, and scarcely leave a scar.

The author of this method makes a general application of it in all cases of erysipelas, but it is intended in these pages to limit its use to the *cellular* variety of phlegmonous erysipelas; not in order to relieve *stricture*, but to reduce an *inordinate distension*, by allowing a free discharge of *blood* and *effused serum*.

Mr. Lawrence's method.—The second mode consists in "one or two deep and long incisions."

"This practice was proposed by Mr. Lawrence. In page the sixty-seventh of his observation on erysipelas, he says,

"The most powerful means of arresting the complaint is by making incisions through the inflamed skin and the subjacent adipous and cellular textures, which are the seat of disease. These incisions are followed very quickly, and sometimes almost instantaneously, by relief and cessation of the pain and tension; and this alleviation of the local suffering is accompanied by a corresponding interruption of the inflammation, whether it be in the stage of effusion, or in the more advanced period of suppuration and sloughing. The redness of the skin is visibly diminished during the flow of blood from the incisions; in twenty-four hours it usually disappears, and the skin itself is found wrinkled from the diminution of the general inflammatory tension. The immediate relief, although very desirable to the patient, is however of less consequence than the decided influence of the practice in preventing the further progress of the disorder; and this important result has never failed to occur, within my experience, when the case has been a proper one for the practice,

and the state of the patient has admitted of its being fairly tried.

"The treatment by incisions is suited to various stages of the complaint; but it is employed to greatest advantage in the beginning, since it prevents the further extension of inflammation, and the occurrence of suppuration and sloughing. The redness and swelling gradually subside; the surface of the cut granulates, and heals rapidly. At a more advanced period, the incisions limit the extent of suppuration and gangrene; at a still later time, they afford the readiest outlet for matter and sloughs, and facilitate the commencement and progress of granulation and cicatrization. When the matter is fully discharged, and the sloughs, whether of the skin or cellular membrane, have separated, a healthy granulatory surface is left, and no great difficulty is experienced in effecting cicatrization, unless the destruction of the skin should have been very extensive, for in this case the cicatrix forms slowly and is liable to give way again."

The objections which have been made to this bold practice of Mr. Lawrence lie only against its general application to the three above esta-

blished varieties of phlegmonous erysipelas.* In his twenty-second case, "an incision was made along the whole breadth of each eye-lid and through the entire depth of the inflamed and

* Mr. Hutchinson, in page 219 of Volume XIV. of the London Medico-Chirurgical Transactions, condemns this practice in the following words: "I do loudly protest against the practice of making the incisions of such length, as recommended by Mr. Lawrence, both as unnecessary, and not so likely to stop the progress of the disease, where it is spread over a wide surface, as several small incisions made on different parts where the disease is found to be most active; for it will have been seen by the closely observing surgeon, that when this disease has run on to suppuration or to gangrene, abscesses or gangrenous patches are occasionally found to have taken place in different parts laterally distant, and having no communication with each other. Now, if one long incision be made in a direct line through the middle of the inflamed surface, according to Mr. Lawrence, the disease may be still unsubdued, though greatly lessened on each side of it, to a certain distance. But supposing the disease be found to occupy a space from the trochanter to the toes, including the whole circle of the thigh, leg, and foot, which I have witnessed in two or three cases, wherein eighteen incisions were certainly made of an inch and a half in length, will one or even two incisions of fourteen inches in length arrest such an extent of disease? My experience teaches me that they will not, and hence it is, that I have stated, that in such desperate cases we must have recourse to such a number of small incisions, according to the extent of inflamed surface, as will arrest the disease."

swoln cellular stricture.* He states that the palpebræ were "*enormously swoln* and shining," *i. e.* distended by serum. Now this constitutes, as has been shown above, the cellular variety of phlegmonous erysipelas, like that which occurs in the perineum, labia, penis, and scrotum where the adipous tissue is absent, and calls exclusively for the *early* employment of the mode of puncturing recommended by Dr. Dobson.

The practice of long and deep incisions seems also injudicious in cases which involve a great extent of surface.

But this practice of Mr. Lawrence is indispensable in the adipous variety of phlegmonous erysipelas, where the chief indication is the *relief of stricture.*

The subcutaneous adipous tissue, when unconnected with a subjacent cellular tissue, as on the back of the thigh for example, is, so to speak, hide bound on its outer surface, resisted by dense fascia on its inner, whilst within its substance the tumid cysts are pressed upon by binding filaments. This three-fold mode of constriction produces the

* See page 133 of his Observations, &c.

rapid sloughing and profuse suppuration which characterizes this variety of the disease. *Early, deep* and *long* incisions are, therefore, absolutely required to give the inflamed adipous tissue a free release.

Mr. Hutchinson's method.—The third mode consists in making *several* deep but *short* incisions into those parts of the affected surface where the disease is most active. Mr. Hutchinson, who introduced this practice, recommends the early recourse to it, with the view to prevent fascial and sub-cellular suppuration and gangrene.* This mode is peculiarly suited to the *adipous-cellular* variety of phlegmonous erysipelas. Since this variety is characterized by only a moderate degree of distension and stricture, these short but numerous incisions answer a two-fold object: First, they relieve the moderate degree of stricture; and, Secondly, remove any deep seated distension.

Each of the three modes of incision, above specified, is recommended by its respective author in all cases of phlegmonous erysipelas, to the exclusion of the rest. But, if the subcutaneous adipous and

* See Volume V. of the London Medico-Chirurgical Transactions.

subcutaneous cellular tissues are essentially different in their structures and uses; and if this difference gives rise to three varieties in the disease, the impropriety of a general application of any one of them to all cases is at once apparent. Each has its own sphere of usefulness.

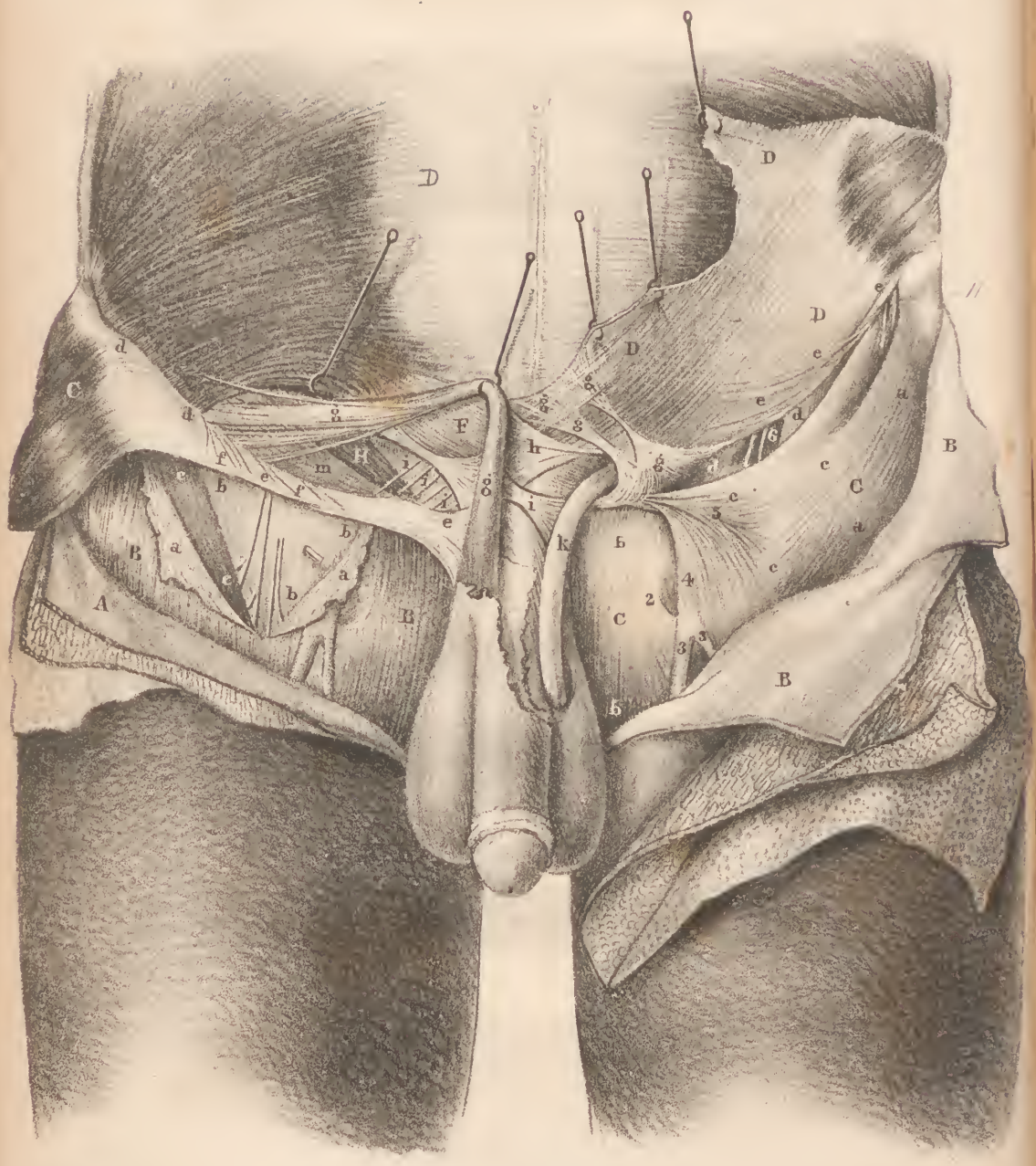
The generic practice by incision, which has thus been shown to be curative in phlegmon, anthrax, paronychia, and phlegmonous erysipelas, is also applicable to the *strictured condition* of every other disease of the integuments.* Nor need the practice be confined to the human species: all animals, which have a thick derm or a subdermal adipous tissue, or both, may derive benefit from it in the diseases of these parts.

Encysted Tumours.—In closing these pathological observations, it may not be out of place to add a remark upon Encysted Tumours of the in-

* Bubo, for example, sometimes becomes what is called a burrowing ulcer; venereal eruptions, also, assume occasionally this character: both are ulcerations of the subdermal tissue, which detaches the derm. These burrowing ulcers may exist before and after the venereal action is destroyed by mercury. Under the first condition, the treatment is to use mercury freely and divide the overhanging detached derm, and under the second, to employ incisions alone.

teguments. Some of them seem to be cysts of the adipous tissue, enlarged and altered by disease. Those on the anterior surface of the body, being but slightly attached to the surrounding parts, are removed with comparative ease; whilst those on the posterior surface, being secured by strong filaments of the adipous tissue which require division, are extracted with difficulty. These are the filaments which were described in a former page as possessing, in certain parts of the integuments, the fibrous nature of the strong fascial covering of muscles.

Plate II.



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CHAPTER III.

DESCRIPTION OF PLATE II.

This plate exhibits, on the left side of the subject, the integuments reflected upon the thigh, to display the tendon of the external oblique muscle of the abdomen, the fascia lata, and three adventitious fasciculi of fibres. On the left side, a further dissection is made, to expose the subjacent structure.

Left Side.

A The reflected derm and subdermal adipous tissue.

B B The subjacent cellular tissue, called fascia superficialis, reflected from the fascia lata, and tendon of the external oblique.

C C C The fascia lata.

a C a The portion of the fascia lata which covers the sartorius muscle; forming the anterior part of its sheath: it may therefore with propriety be called the *sartorial* portion.

11 The outer pair of anterior superficial crural nerves, appearing at the anterior superior spinous process of the ilium, and passing under this sartorial portion of the fascia lata.

b C b The portion of the fascia lata which covers the pectineus muscle; to be called, therefore, the *pectineal* portion of the fascia lata.

22 The semilunar edge of the pectineal portion of the fascia lata.

c c C c The funnel-shaped portion of the fascia lata; being the external laminæ of the sheath of the crural vein, artery, and nerve; and called the crural sheath, or, the *vaginal* portion of the fascia lata.

33 The branches of the vena saphena at its junction with the ensheathed crural vein.

444 The cribriform surface of the crural sheath, called so, on account of the numerous small perforations made by the entrance of absorbent vessels. The fibres of this part of the

sheath interlace with those of the pectineal portion of the fascia lata; the line of interlacement extending from the semilunar edge of this portion to within a few lines of the pubis.

555 Converging fibres of the sheath, forming a ligament-like process. This process makes an attachment to the edge of the pubis, immediately behind that made by the tendon of the external oblique muscle. In effecting this horizontal attachment, the process makes a sigmoid twist, in consequence of which a crescent edge is formed extending downward and obliquely outward. This edge is called the *crescentic edge* of the fascia lata: to distinguish it from the semilunar edge of the pectineal portion of the fascia lata, it may be termed the crescentic edge of the vaginal portion of the fascia lata.

d d A deeper seated lamina of the fascia lata. It proceeds from the inner edge of the tendon of the external oblique*, and is thence continued downward, to contribute to the formation of the crural sheath.

6 A well defined arched opening for the passage of the middle pair of anterior crural nerves, figured in the plate.

e e e One of the three adventitious fasciculi of fibres above referred to. This fasciculus is evidently derived from the fascia lata; near its origin, the fibres are twisted into a cord; further off, they diverge so as to be scattered on the external and internal surfaces of the tendon of the external oblique muscle of the abdomen. As this fasciculus proceeds from the thigh, it may be called the *crural* fasciculus.

D D D The tendon of the external oblique muscle of the abdomen.

g g g, g g g The other two adventitious fasciculi of fibres above referred to. They are de-

* Called Gimbernat's ligament, or inner edge of the tendon, &c. The fibres of the deeper seated lamina are erroneously drawn in a direction from above downward. They have the general direction as the other fibres of the fascia lata.

rived from the opposite side of the abdomen, apparently from the tendon of the internal oblique muscle. From this origin, as it seems, they first appear on the outside of the tendon of the external oblique, then disappear, and again issuing as two distinct converging fasciculi, pass over the split in the tendon of the external oblique; from this spot the fibres of the two fasciculi diverge, and proceeding downward, they are continued over the reflected edge of the tendon upon the fascia lata, viz. upon its ligament-like process 555, and its deeper seated lamina d d. As these fasciculi proceed from the abdomen, they may be called the two abdominal fasciculi.

h h h The diverging termination of some of the fibres of the tendon of the external oblique, called the upper pillar of the abdominal ring.

i i i The termination of other fibres, called the lower pillar of the ring.

k k The spermatic cord passing out at the oval opening, called the abdominal ring. This opening is made by the two pillars above noticed, and the two adventitious fasciculi of fibres.

Right Side.

A The reflected integuments.

B B B The fascia lata.

a a The external lamina of the fascia lata, divided and reflected, to expose the inner lamina (or layer) of the crural sheath.

b b b The inner layer of the crural sheath, the upper part of which is exposed on the left side of the plate, and noticed under the letters d d.

c c A portion of the sartorius muscle, also exposed by the reflection, together with the inner anterior nerves, and the destination of the middle anterior crural nerves.

C The external oblique muscle reflected upon the thigh.

d d d The portion of the tendon which interlaces its fibres with those of the sartorial portion of the fascia lata. It may properly be called the *interlaced* portion of the tendon of the external oblique muscle.

d e e e The portion of the tendon which is reflected inward, and has its fibres inserted ultimately into the pubis in radiating lines. This is called the *reflected* portion of the tendon; the edge made by the reflection is termed *Poupart's* ligament; the inner, or

true edge of the tendon, is termed *Gimbernat's* ligament.

f f f The inner diverging fibres of the crural fasciculus, noticed on the left side of the plate under e e e. They pass in at the arched opening marked 6 on the left side, are scattered on the inner surface of the tendon, and are united with other fibres coming from the mesial line of the abdomen.

D The internal oblique.

g g g The spermatic cord removed from its natural situation, covered with its cellular sheath, and connected with the cremaster muscle and nerve.

F F A muscular fasciculus, which is not intimately connected with either the internal oblique or transversalis muscles. Its tendon passes into the fibrous interlacement over the pubis. It seems to be an insulated portion of the internal oblique.

H Another fasciculus of insulated muscular fibres belonging to the transversalis, rather than to any other muscle; and having delicate tendons inserted into the pubis.

i i i A few delicately formed but strong fibres, having an obliquely vertical direction: they embrace the pubal part of the funnel-shaped sheath.

k A small portion of the fascia transversalis, appearing in the midst of the three above noticed parts.

m The upper portion of the crural sheath: it may be called the *abdominal* portion, since it is situated above the lower edge of the tendon of the external oblique muscle,—or the *transversalis* portion, since it is interlaced, at its upper edge (or brim), with the fascia transversalis.

SECTION I.

TENDON OF THE EXTERNAL OBLIQUE MUSCLE OF THE ABDOMEN.

Structure.—The tendon of the external oblique muscle of the abdomen* is composed of parallel fibres; each proceeding from a distant muscular fasciculis, and having a separate insertion.

* The external surface of the tendon of the external oblique is coated with a thin and merely perceptible layer of elastic matter, resembling that of the yellow ligament found so abundantly on this tendon in herbivorous animals.

In these animals, such as the deer for example, this yellow ligament is a thick plaited membrane, covering the entire surface of the tendon. In birds it does not exist.

By its elasticity, it safely and conveniently permits those variations to which the abdomen, with its many causes of distension, is liable.

Directions of the fibres.—The directions of these tendinous fibres vary: those in the upper abdominal regions ascend obliquely from the muscle: those in the middle regions are transverse: whilst those of the iliac and hypogastric regions proceed obliquely downward.

Abdominal ring.—In the hypogastric portion of this membranoid tendon, on both sides, there is an opening called the *abdominal ring*, which deserves particular notice. It is an oval, laid obliquely downward in the course of the fibres of the tendon, the lesser transverse curve being towards the pubis. Its margin is formed by a union of these fibres with others proceeding from the opposite side of the abdomen.

The isosceles triangular split in the tendon.—The hypogastric portion of the tendon is, for the space of two inches from the pubis, so separated in the direction of its fibres, as to make an *isosceles triangular opening*, with the base at the pubis. The diverging fibres, by overlapping those which run next to them, form thick and corded edges on the sides of the aperture. Those same fibres again separate and are lost in a fibrous interlace-

ment at the pubis. This divergency causes the fibres at the two sides of the opening (called the two pillars of the ring) to decussate, and thereby form the *lesser transverse curve* of the abdominal ring.

The tendon of the external oblique only *contributes*, then, to the formation of the abdominal ring, and does not complete it.

The greater transverse curve.—The greater transverse curve of the oval, required as a security against a further splitting of the tendon, is made by adventitious fibres represented in Plate II. under the letters g g g, g g g, and called the two abdominal fasciculi. They both pass across the triangular opening of the tendon; the innermost of them presenting a well defined edge, which constitutes the greater transverse curve of the oval, and completes the abdominal ring.

The two abdominal fasciculi of fibres.—These two abdominal fasciculi of fibres deserve further notice.

First. The action of the muscle, if unrestrained, would lengthen the split in the tendon throughout the whole course of the fibre, and thereby render

the spermatic cord liable to displacement and the bowels to protrusion : but these adventitious fasciculi, by their deep origin on the opposite side of the abdomen, their interlacement above the pubis, their interlacement also with the tendon above the split, and by their connexions with the fascia lata, firmly retain the portions of the tendon above and below the abdominal ring in a due degree of approximation; and thereby prevent those injurious consequences.

Second. They connect the abdomen and thigh: the fibres of the inner fasciculus are distributed over the reflected portion of the tendon and the ligament-like process of the fascia lata; and those of the outer are in like manner distributed over the reflected tendon and an inner layer, d d, of the crural sheath. These delicate fibres, which may seem at first sight unworthy of notice, are, therefore, by their origin in the opposite side of the abdomen, and their interlacements, made a very important bond of union between the thigh and the abdominal parietes.

Third. They have a surgical importance hitherto overlooked, in strangulated inguinal hernia. Although every part in the ring presses equally upon

the tumour, nevertheless there is one part, the division of which will most effectually relieve the stricture. This part is the *greater transverse curve* formed by the innermost of the two fasciculi.

Without these fasciculi there would be no stricture. For in their absence the triangular opening of the tendon would be gradually enlarged by the protruding of the hernial tumour. In the operation, therefore, for strangulated inguinal hernia, those fibres which proceed from the opposite side of the abdomen, rather than those of the tendon of the external oblique of the affected side, are to be divided: and the precise spot for the division is at the crossing of the fibres of the innermost fasciculus.

Finally. If the fasciculi under notice, proceed from the internal oblique muscle of the opposite side, as those of the two pillars do from the external oblique, then *all* the fibres which compose the ring are traceable to muscle.

This view involves the important question whether the size of the abdominal ring can really be affected by muscular action?

The contraction of the external oblique muscle

would, if unresisted, approximate the pillars of the ring; that of the internal oblique of the opposite side would not only do the same, but also shorten the transverse diameter of the oval; and their combined action, consequently, would render the abdominal ring smaller without altering its shape.

The ring, therefore, when diminished in size by muscular action, may stricture a hernial tumour, and that stricture may be relieved, without the division of its margin, when muscular relaxation allows the enlargement of the ring.

These remarks are made not without some hesitation. Still, they very satisfactorily explain the effect of blood-letting in strangulated hernia, and increase the importance of a recourse to the taxis.

The crural fasciculus of fibres.—There is on the tendon a third fasciculus of fibres, figured under the letters e e e of Plate II. which proceeds from the fascia lata and scatters its fibres divergingly on *both* surfaces of the tendon. The use of this *crural* fasciculus, in the mechanism of the groin, will be better understood after the destination of the tendon below the ring has been shown.

This part of the tendon may be divided into two portions: First, that which makes a *strong interlaced* attachment to the fascia lata. Second, that which has its fibres turned inward to form a triangular reflexion, the base being attached to the pubis.

The interlaced portion of the tendon.—The first or interlaced portion is represented in Plate II. under the letters d d d: it is shown also on the left side of the same Plate under the letters e e e.

The fibres are of unequal length; being successively shorter as they approach the anterior superior spinous process of the ilium. This inequality allows a connexion to be made with the fascia lata in an *oblique* line—or, as it may be called, the line of the groin, which is subordinate to the motions of the hip-joint, and the same with that shown to exist in the fascia superficialis.*

This oblique crural connexion extends from the anterior superior spinous process of the ilium to the place of exit of the middle anterior pair of nerves; and is made by the fibres of the tendon

* See page 48.

overlapping alternately the horizontal fibres of the fascia lata. The tendon and fascia are *woven* into each other, and constitute thereby one of the strongest attachments which exist between the abdominal parietes and the thigh.

The reflected portion of the tendon.—The second or reflected portion is displayed under the letters d e e e on the right side of Plate II., unfolded and turned down upon the thigh. Its fibres, situated between the above mentioned interlaced portion and the lower pillar of the ring, are all reflected inward so as to present a folded edge: extending in an oblique downward line from the place of exit of the middle anterior nerves to the pubis.

This edge is called *Poupart's Ligament.* The inner, single and real edge of the tendon is called *Gimbernat's Ligament.*

The reflected portion of the tendon, included between these two edges, has a triangular form, presenting a base about a half inch in breadth, which is inserted into the pubis. This base contains every fibre of the reflected portion, each of

which is fastened into the aponeurosis of the bone.

At the angle opposite to the base, a fastening is also needed. Here, the interlacement with the fascia lata is discontinued, and the inward reflection of the fibres of the tendon commences. Every contraction of the external oblique therefore will tend to separate the reflected from the interlaced portion, and then to unfold the reflexion.

At this weak point, the *crural fasciculus* of fibres is placed. It is a portion of the fascia lata originating at the anterior superior spinous process of the ilium, and lying as a twisted cord, on the oblique line of interlacement of the tendon and fascia.

The external fibres of the crural fasciculus.—This cord sends off one set of diverging fibres, which are scattered in curved lines upon the *external* surface of the tendon, to be united with fibres of the outer abdominal fasciculus; and another set, which, passing in at the point of reflexion of the tendon, are scattered upon its *internal* surface and unite with fibres belonging to the supubal ligament.

By this distribution of fibres, the crural fasciculus fastens the *reflected* portion of the tendon as securely to the fascia lata, as the other portion of the lower edge of the tendon is secured by the interlacement. It stays the tendon down to the thigh at the point of reflexion, and effectually prevents muscular contraction from splitting or unfolding it.

The above examination of the tendon of the external oblique furnishes the following summary: first, the abdominal ring is made of two sets of fibres, and seemingly varies in size from muscular action: secondly, the part of the ring to be divided in the operation for strangulated inguinal hernia, is formed by the *inner abdominal fasciculus of fibres*, and not by the fibres of the tendon of the external oblique: thirdly, the crural and the outer abdominal fasciculus of fibres co-operate to strengthen the tendon and prevent an extension of its triangular opening: fourth, the membranoid tendon inserts its fibres into the linea alba, the supubal interlacement, the sides of the pubis, and, *in four different modes*, into the fascia lata; viz.

by an interlacement of a portion of its lower edge; by the crural fasciculus which holds the tendon at the point of reflexion and termination of the interlacement; by the outer abdominal fasciculus which connects the inner edge of the reflected portion of the tendon with an inner layer of the crural sheath; and, lastly, by the inner abdominal fasciculus which binds together the reflected edge of the tendon and the ligament-like process of the fascia lata.

SECTION II.

THE INTERNAL OBLIQUE MUSCLE OF THE ABDOMEN.

The fibres of this muscle are directed upward from their origin, and terminate in a broad tendon, making by its division into two layers, a sheath for the recti muscles.

An insulated portion of the internal oblique.—Below this ascending portion of the internal

oblique, there is a small portion, figured under the letters F F in Plate II. having its fibres directed *obliquely downward*, and terminating in a tendon, which, instead of contributing to form the sheath of the recti muscles, passes into the fibrous interlacement above the pubis, and is continued through it, as it would seem, to become the two abdominal fasciculi g g g, g g g.

SECTION III.

THE TRANSVERSALIS MUSCLE OF THE ABDOMEN.

A remark similar to that on the internal oblique may be made relative to the lower portion of the transversalis muscle.

Insulated fibres of the transversalis.—Below the compact mass of transverse fibres which constitute this muscle, there are a few scattered muscular fasciculi, represented under the letter H. in Plate II. They originate about the place

of exit of the spermatic cord, called the internal abdominal ring, whence they obliquely descend, and are inserted, by means of long tendinous threads, into the pubis. Thus arranged, they embrace vertically and support the horizontal fibres of the funnel-shaped crural sheath; and lie between that sheath and the reflected portion of the tendon of the external oblique.

SECTION IV.

THE CREMASTER MUSCLE.

The cremaster muscle is composed of distinct fasciculi, which at their origin are separated from each other, and are collected together upon the spermatic cord.

It is generally regarded as being a part of the internal oblique muscle, and as originating from the inner surface of Poupart's ligament.

Origin.—A careful dissection will show the inaccuracy of this opinion. It originates from

that portion of the fascia lata which is situated between the fascia transversalis and the line of interlacement of the tendon of the external oblique. Each separate muscular fibre has a long tendinous thread both at its origin and insertion: the one is interlaced with the fibres of the fascia lata, and in its course adheres to the inner surface of the tendon of the external oblique, from which it is easily separated; the other is united to the spermatic cord.

CHAPTER IV.

DESCRIPTION OF PLATE III.

This plate exhibits, on the right side, the fascia transversalis, the crural sheath, and the mode of their connexion with each other: and on the left side, the ligament-like process of the fascia lata; showing its manner of attachment to the pubis, and the seat of crural hernia.

Right Side.

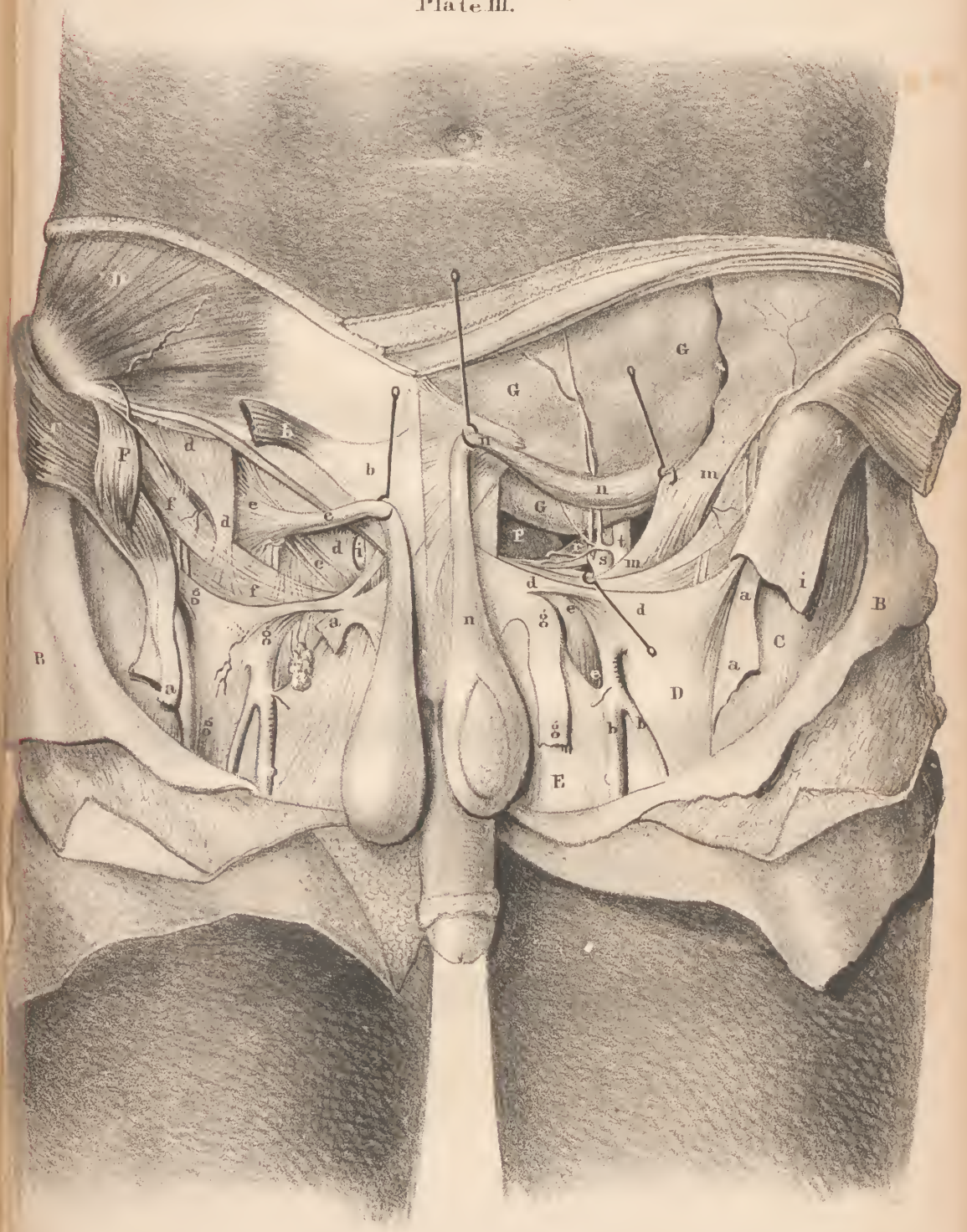
A The reflected integuments of the abdomen and thigh.

B The reflected fascia superficialis.

C The reflected external oblique muscle of the abdomen.

a a The lower portion of its tendon, divided in order to show that all its fibres are inserted into the pubis *more outwardly*

Plate III.



M.S.Weaver del.

T.Sinclair's Lith.

than has been generally believed, and that none of them, therefore, can possibly contribute to form the seat of crural hernia.

D The internal oblique muscle of the abdomen.

b b A section of the muscular fasciculus which sends its tendon into the supubal fibrous interlacement. Some of the fibres of this tendon seem to be continued through this interlacement, and to become the abdominal fasciculi, figured under g g g, g g g in Plate II.

E The transversalis muscle of the abdomen.

c c Some muscular fibres, originating at the place of exit of the cord, and inserted into the pubis by long tendinous threads. These fibres are represented in Plate II. under the letter H, and more particularly noticed in the third section of Chapter III.

F The cremaster muscle, detached from the spermatic cord and reflected upon the thigh, *originating* from the fascia lata, within the interlacement of this fascia with the tendon of the external oblique and outside the fascia transversalis,—separated from the transversalis muscle by the circumflex iliac artery. (See the fourth section of Chapter III.)

d d d The fascia transversalis, showing the oblique and longitudinal direction of its fibres; their interlacement with the upper edge of the crural sheath on each side of the spermatic cord; and the place of exit of the circumflex iliac artery.

e e e The conical part of the cellular sheath of the spermatic cord. It is continuous with the cellular tissue found between the fascia transversalis and the peritoneum. At the under part of it two curved lines are exhibited, formed by the vas deferens and the epigastric artery, which last is traced by a dotted line.

f f f f The abdominal or transversalis portion of the crural sheath, showing its connexion with the fascia transversalis by means of a strong interlacement.

The space bounded by the margin of the sheath, and the edges of the two portions of the fascia transversalis on each side of the conical cellular sheath of the spermatic cord, is called the internal abdominal ring. It is an aperture presenting three strong fibrous edges, two of which are longitudinal, made by the fascia transversalis, and one horizontal, made by the crural sheath. Through this deep seated *triangular* opening, the bowel, covered by the peritoneum, passes from the abdominal cavity into

the cellular sheath of the spermatic cord, to become an inguinal hernia. By it, also, in some instances, the bowel is strangulated.

g g g The crural sheath below the tendon of the external oblique.

h h Absorbent glands, with their vessels which pass into the pelvic cavity through an opening in the crural sheath.

i An incipient ventro-inguinal hernia, found in one of the dissections.

Left Side.

A The reflected integuments.

B The reflected fascia superficialis.

C The sartorial portion of the fascia lata.

D The vaginal portion of the fascia lata.

a a A superficial layer of fibres, dissected from this portion, to show the line of separation between the sheath of the crural vessels and that of the sartorius muscle.

b b Branches of the vena saphena, entering the ensheathed crural vein, by a common trunk.

d d d The crescentic edge of the vaginal portion or *crural sheath.*

d d u The ligament-like process of the vaginal

portion of the fascia lata,—the true seat of stricture in crural hernia. (See Plate II. *5 5 5*, and the description.)

E The pectineal portion of the fascia lata.

c c The semilunar edge of the pectineal portion.

e e e The deep fissure between the pectineal and the vaginal portion of the fascia lata.

g g i i Divided and displaced portions of the tendon of the external oblique, showing, first, that the portion i i is interlaced with the fascia lata (See d d d, in the description of Plate II.); second, that the portion g g is *more outwardly* inserted into the pubis than the ligament-like process of the fascia lata, thereby demonstrating, again, *that no part of the tendon of the external abdominal muscle contributes, in any degree, to form a seat of stricture in crural hernia.*

k k k The abdominal or transversalis portion of the crural sheath, showing its origin from the iliac portion of the fascia lata.

m m A portion of the fascia transversalis; exhibiting its connexion with the part, k k k, of the crural sheath, and its *change into cellular membrane*, as it ascends upon the abdomen.

n n n The spermatic cord.

G G G The peritoneal sack.

p p The distended bladder.

r r r The brim of the pelvis.

s t The crural vein and artery with their principal branches, situated behind the fascia transversalis and dipping into the crural sheath.

The space bounded by the crural veins, the brim of the pelvis, r r r, and the ligament-like process of the fascia lata, d d u, is a small conical or thimble-like cavity, into which the end of the little finger may be thrust. This will be hereafter named the *ventro-crural passage*. Through it the bowel passes, in crural hernia.

SECTION I.

FASCIA TRANSVERSALIS.

Some portions of the fascial system consist of a single layer of inelastic shining fibres, traversing the cellular tissue in parallel lines to a certain distance and then abruptly terminating, so as to form a fibrous structure continuous with cellular membrane, or to make this cellular membrane in certain places, fibrous. The cellular tissue, between the peritoneum and the

transversalis muscle, is thus made fibrous in the iliac and hypogastric regions, as shown under the letters d d d, on the left side of Plate III. and partially on the left side, under the letters m m. This is called the *fascia transversalis*.

Structure.—It is a fibrous membrane, consisting of a single layer of parallel inelastic shining fibres, immediately connected with the cellular tissue which is situated on the outside of the peritoneum, and which is protruded before the testicle to form the cellular sheath of the spermatic cord.

Interlacement with the crural sheath.—In the iliac regions, the fibres are oblique; elsewhere they are vertical. Those over the pubis, are inserted into the bone; the rest are interwoven with the horizontal fibres of the third or abdominal layer of the crural sheath, thereby preserving its funnel shape, and constituting the internal interlacement which connects the abdominal parietes with the thigh.

An absence of the fibres where the vessels of the cord pass out and the vas deferens enters, as shown by the letters e e e, causes the fascia to be separated into two columns, one on the left and

the other on the right of the split occupied by the cord.

Internal abdominal ring.—The opening thus formed has received the name of the internal abdominal ring. From it the bowel issues in inguinal hernia. It is a triangular aperture, covered by the cellular sheath of the spermatic cord, whose margin consists of three unyielding fibrous edges: the lower one made by the crural sheath; the others by the fascia transversalis. Obliquely over this inner part of the internal abdominal aperture, pass the muscular fasciculi, described under the letter H of Plate II. and under the letters c c of Plate III. It may be a question, whether these fasciculi can modify the size of the aperture.

Seat of ventro-inguinal hernia.—The incipient ventro-inguinal hernia, represented under the letter i, on the right side of Plate III. shows that the seat of this species of rupture is in the fascia transversalis; and that it is made by an artificial opening in the *longitudinal parallel fibres*. This suggests the propriety of a *lateral* incision to relieve it when strangulated.

SECTION II.

THE CRURAL SHEATH.

The sheath which includes the crural vein, artery and nerve, resembles in structure, the other fibrous sheaths or channels of vessels throughout the body. They are all formed from the fascia of muscles, which consists of parallel inelastic fibres and cellular tissue. Now, fascia being an *uninterlaced* structure, allows by the separation of its layers, the formation, in its substance, of channels for trunks and large branches of arteries, veins and nerves. *The vessels are thus ensheathed by the fascia.*

Form and Septa.—The *crural* sheath is funnel-shaped, divided by two septa into three channels,* through which the crural nerve, artery and vein separately pass from the abdomen to the thigh. The peculiarity in the form of this sheath, is in no

* There is also a fourth channel on the inside of the vein, made by the ligament-like process of the fascia lata, filled by absorbents, cellular tissue, and occasionally by an absorbent gland, which will be more particularly noticed hereafter.

way caused by the contained parts: but results exclusively from the double relation which the crural sheath holds respectively to the abdomen and the thigh.

Under portion.—The crural vessels and nerve, being situated in an angular depression, one side of which is formed by the pectineus, and the other by the lower portions of the psoas and iliacus muscles, the fascial covering of these muscles will necessarily constitute the *under portion* of the crural sheath.

The fascia enveloping the pectineus is part of the fascia lata; that over the lower portions of the psoas and iliacus is a continuation of the fascia which covers them in the iliac region of the abdomen, and is called the fascia iliaca. To preserve, therefore, this arbitrary division of the *same* fascial structure, it may be said, that the *under* portion of the crural sheath is formed, on the inner side, by the fascia lata, and on the outer side by the fascia iliaca. A description most suitable, however, to the present state of Anatomy, would be, that the under portion of the crural sheath, on the inner side is formed by the *pectineal portion*, and, on the outer side, by the *iliac*

portion of the common fascial covering of the lower extremities.

Upper portion.—The *upper** portion of the crural sheath, from its many important connexions, requires a minute description.

The drawings exhibit it in different stages of dissection: viz. under 5 4 4 4 c c c d d on the left; and under a a b b b m on the right side of Plate II. Also, under g g g f f f on the right, and under d d d D k k k a a on the left side of Plate III.

Two inner layers.—This upper portion consists of five layers of fibres. The deepest of them covers the nerve only, and passing under the artery and vein, is again lost in the fascia lata: the second layer above, covers the nerve and artery, and passing under the vein, is also lost in the fascia: the rest cover the nerve, artery, and vein. Thus are formed, in the sheath, the two septa which separate the contained parts from each other.

Three outer layers.—The three outer layers of the sheath, just mentioned, deserve further notice.

* The words *upper* and *under*, as here used, signify above and below the contents of the sheath, the body being supine.

They are triangular, and make five different connexions; a knowledge of which is necessary for a full understanding of the mechanism of the the groin; it will also show the true seat of stricture in crural hernia.

Connexion with the pectineal fascia.—One of these connexions is made with the pectineal portion of the fascia lata, in a line on the inside of the crural vein, represented under the letters e e e on the left side of Plate II. It extends from the semilunar edge of the pectineal fascia, to within a few lines of the pubis.

Connexion with the pubis.—A second connexion is that made with the pubis. The fibres converge to form a ligament-like process, shown under the letters d d d on the left side of Plate II. This process, when detached from the pubis, is found to be a flat fibrous strap, being a line in thickness, and half an inch in breadth at its pubal end, having an upper horizontal and a lower oblique edge, and presenting a vertical surface. The re-attachment to the pubis will necessarily turn the line of the pupal end from a vertical to a horizontal position, and thereby make a permanent *sigmoid twist* in the process.

This twist produces the three following effects.

First. It separates the fibres of the ligament-like process from those connected with the pectineal fascia, so as to form an angle and consequently a triangular opening between the abdomen and thigh.

Through this *natural* aperture, the superficial absorbents of the lower extremity enter the pelvic cavity, and the bowel, in crural hernia is forced out.

Folded edge of the process.—Second. It forms a reflected or folded edge in the process, dividing it thereby into an upper horizontal and an under* oblique portion. The former is *quadrangular*, and bounded on three of its sides respectively, by the line of the pubal connexion, by the horizontal and by the folded edge; the latter is *triangular* and bounded on two of its sides, by the folded and oblique edges. This *lower triangular portion* is the seat of stricture in crural hernia; and is the part to be divided.

Crescentic edge.—Third. It makes the *crescen-*

* In the use here of the words *upper* and *under*, the body is supposed to be in the erect position.

tic edge of the crural sheath, represented on the left side of Plate III. under the letters d d d. The outermost layer of fibres is thrown, by the convergency which forms the ligament-like process, into radiating lines or plaits, the lowermost of which is curved by the sigmoid twist; thereby forming the crescent-shaped edge. This edge should not be confounded with the semilunar edge of the pectineal portion of the fascia lata.

The three connexions, which remain to be described, are those by which the crural sheath is firmly attached to the parietes of the abdomen. They are made by the *upper edges* of the three outer layers of the sheath, which project one above the other.

Connexion with the folded edge of the tendon.— The external layer is attached to the *folded* edge of the tendon, called Poupart's ligament. This attachment is exclusively made by those deep seated and compacted laminæ of the fascia superficialis which form the inguinal line. When the *cellular* bond is removed, the folded edge and the external layer part from each other; the former drawing upwards to a straight line, whilst the latter, in falling at its middle, presents a line of

increased curvature, which is definitely marked on the left side of Plate II.

The long semilunar opening shows the second layer of the sheath under the letters d d. It is more extensively displayed on the right side of Plate II. under the letters b b b.

Connexion with the single or inner edge of the tendon.—This layer is connected with the *inner* or *single* edge of the tendon, called Gimbernat's ligament. But these are both too deeply seated to derive the means of union from the fascia superficialis; and the fibres being parallel, it cannot be effected by interlacement. The connexion is therefore made by the outer abdominal fasciculus. The fibres of this fasciculus, having passed below the abdominal ring, diverge, and reaching the folded edge of the tendon, are turned round it; then traverse the reflected portion, and meeting the inner edge, are reflected down upon the layers of the sheath; thus forming a *fibrous* bond of union between the inner edge of the tendon and the second layer of the sheath.

Connexion with the fascia transversalis.—The third layer of the sheath is connected with the lower edge of the fascia transversalis.

This layer, called in the description of Plate II. the abdominal or transversalis portion of the sheath, is represented, on the right side of Plate II. under the letter m;* on the left side of Plate III. under the letters f f f; and on the right side of the same under the letters k k k.

The fibres of this third layer intersecting at right angles those of the fascia transversalis, a strong interlacement is allowed between these fibrous membranes, similar to that which has been shown to exist between the fascia lata and the tendon of the external oblique.

By means of this third connexion, the upper edge of the funnel shaped-sheath is sustained in a vertical position, and prevented from collapsing on the contained vessels; an inner medium of attachment being thus made between the parietes of the abdomen and the lower extremities.

CRURAL OR FEMORAL HERNIA.

In what manner are the contents of the *abdo-*

* The letters b b b on the same side of Plate II. designate the second layer, which terminates at the inner edge of the tendon; and the letters a a, the external layer, which terminates at its outer and folded edge.

minal cavity protruded, so as to form a tumour on the anterior of the thigh?

The shortest answer to this question is, that a *natural* opening exists between the abdomen and thigh. Air blown into the deep seated crural portion of the fascia superficialis will find its way upward, and inflate the cellular tissue between the peritoneum and fascia transversalis: and so the reverse. A bowel, therefore, forced on the outlet, may, by gradually enlarging it, pass out: and the more easily, if the effort is made during infancy, before the *parallel fibres* of the fascial system have fully acquired their inelastic unyielding character.

Ventro-crural passage.—This outlet is a trilateral passage situated at the pubis, on the inside of the crural vein: one of its sides being this vein, and therefore convex; the second being the pectineal fascia; and the third, namely, the anterior, which is inclined inward, being the triangular portion of the ligament-like process. This opening, lying between the abdomen and thigh, may be properly called the *ventro-crural* passage.

This passage is not formed by the tendon of the external oblique muscle of the abdomen; for

First, the pubal connexion of the reflected portion of this tendon is made *exterior* to that of the ligament-like process of the fascia lata, as is shown under the letters a a, on the right, and under the letters g g, on the left side of Plate III.: Second, the *inner* edge of the tendon is situated *on the outside* of the third or abdominal layer of of the crural sheath, and so intimately united with the second layer of the sheath, that in carefully dissecting off the tendon, this layer will also be removed as if both were the same fibrous membrane.

Formed by the fascia lata.—The ventro-crural passage is formed by the lower triangular portion of the ligament-like process of the vaginal portion of the fascia lata:—it is the result of the sigmoid twist which this process of converging fibres makes in attaching itself horizontally to the pubis.

Upper aperture.—The upper aperture of the passage is pointed out on the left side of plate III. by the figure of a hook, whose point is fixed in the passage. It is an isosceles-triangle laid horizontally, having a convex base, formed by the

crural vein; the posterior portion of the margin being the raised edge of the pubis, and the anterior the folded edge of the ligament-like process.

Lower aperture.—The lower aperture is not represented in the drawings; its location is, however, indicated by the course of the absorbent vessels proceeding from the glands h h on the right side of plate III. These vessels enter the pelvic cavity by this lower aperture of the ventro-crural passage. It also is triangular, yet differs in position from the upper aperture in being oblique and having its base reversely placed. The lower portion of the margin is the upper edge of the layers of the crural sheath, which are interlaced in the pectineal fascia; the upper is the oblique edge of the triangular portion of the ligament-like process.

Variation in size.—The ventro-crural passage varies in size; but not from muscular action. The fibres composing it, unlike those of the abdominal ring, are not united to muscle. The variation is produced by the position of the thigh; when it is flexed inward, the ligament-like process becoming relaxed and somewhat raised, the passage is en-

larged; when turned downward and outward, the process becomes tense and falls, so that the passage is narrowed, and the lower triangular aperture, being obliquely situated, has its angle opposite the base rendered more acute.

The bowel in producing a crural hernia takes the following course.

Course of the bowel.—It enters the upper aperture, and though this may be somewhat enlarged by pressure on the crural vein, yet it is here liable to be strictured by the unyielding anterior and posterior portions of the margin. Its progress in this passage is obliquely inward, by reason of the inclination of the triangular portion of the process. At its exit from the small oblique aperture below, it turns round the upper oblique edge, and is forced upward and outward until it has reached the crescentic edge of the sheath, when its upward course turns obliquely inward, until lodged on the tendon of the external oblique.

In this course the bowel may be strictured in four ways.

Stricture of the upper aperture.—First. A small *cul de sac* of intestine, lodged in the passage may be enlarged by various causes, and strictured

by the *folded* edge of the process, when rendered tense by the outward rotation of the thigh.

Stricture of the lower aperture.—Second. The bowel, having passed the lower aperture, may be also strictured by the *oblique* edge of the triangular portion of the process. The part of the bowel beyond the lower aperture, by being turned upward, forms an angle with that which fills the passage; and in this angle the oblique edge is fixed, ready to produce stricture when made tense.

Treatment.—The relief, in the two above instances, is afforded by retaining the thigh in an inward and upward position, in order to relax the ligament-like process; and by elevating the lower part of the trunk in order that the bowels, by their weight, may co-operate with the external pressure in reducing the protruded portion.

Stricture by the entire passage.—Third. The bowel may so completely fill the passage as to be strictured, not by the upper and lower edge only, but also by the entire triangular portion of the process, even when this is *most relaxed.* This constitutes strangulated crural hernia, and demands a speedy use of the knife.

Treatment.—The operation, which the above

views of structure, teach, consists in dividing the triangular portion of the ligament-like process of the vaginal portion of the fascia lata, from the middle of its oblique edge, upward to its folded edge.

Stricture of the crescentic edge.—Finally. The bowel may *so* accumulate in quantity, particularly if *omentum* be protruded with intestines, as not only to rise above the crescentic edge of the crural sheath, but likewise to be strictured by this edge. This superficial stricture is to be relieved by a crucial division of the integuments and fascia superficialis, which press the bowel against the unyielding crescentic edge.

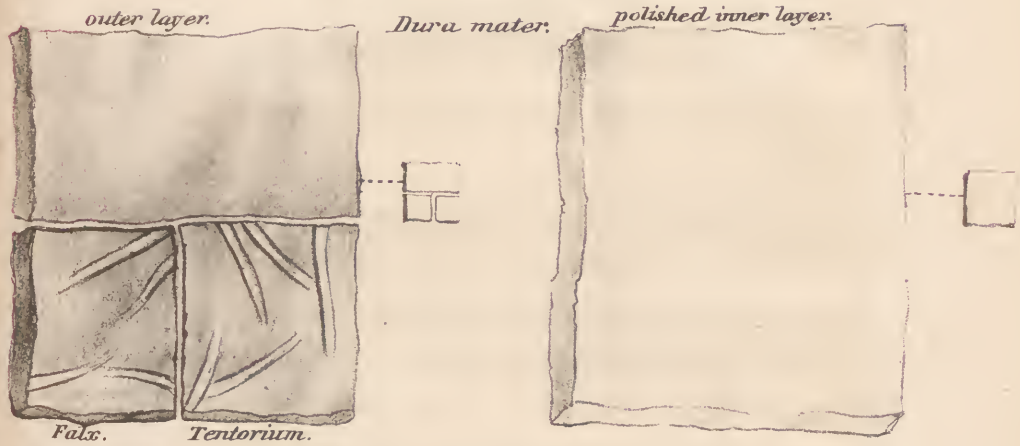
ADDENDA.

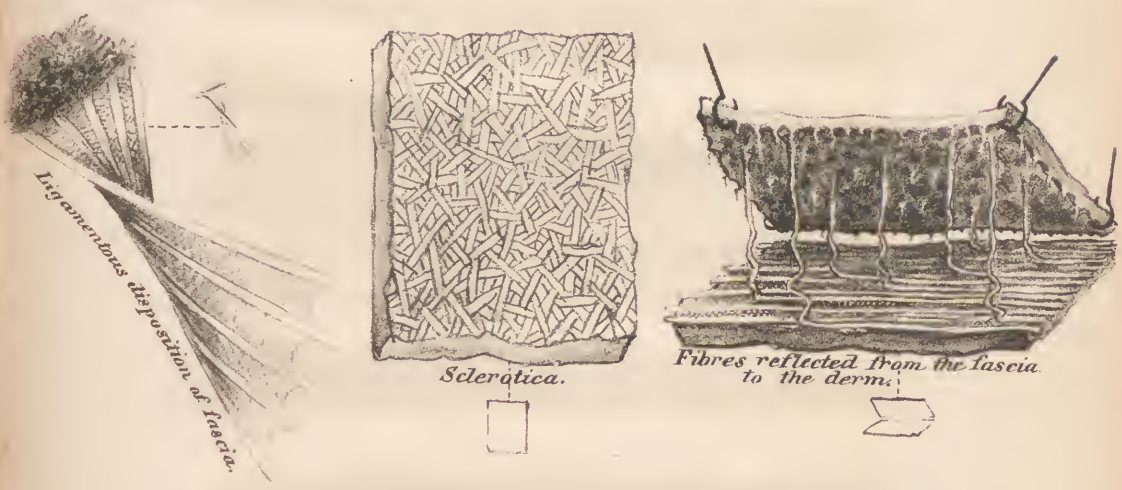
A

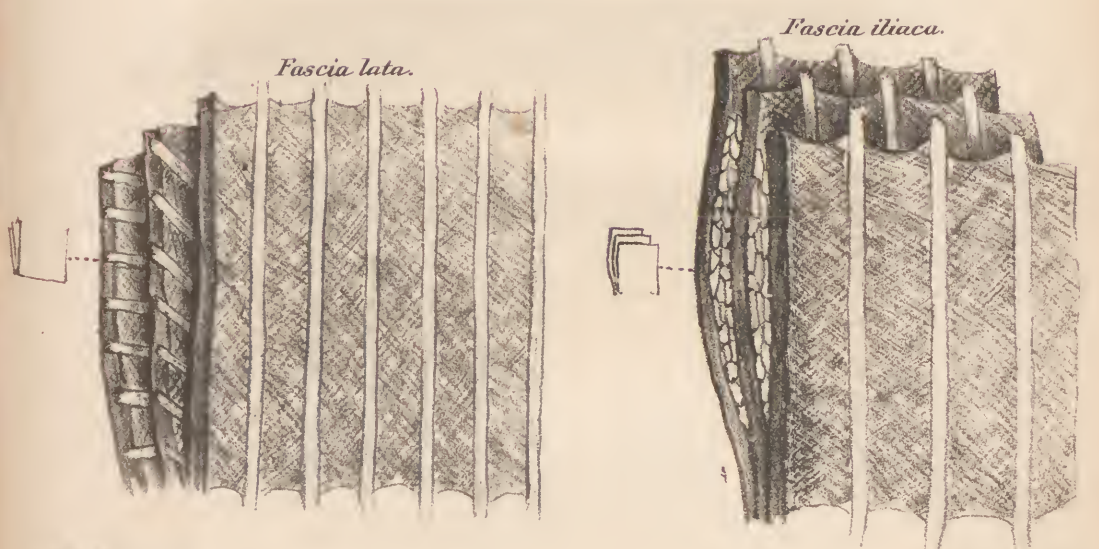
THE drawing by my worthy friend, Mr. M. S. Weaver, of the magnified fibrous tissue, contained in an additional Plate to the present edition, is intended to illustrate the remarks on this subject contained in the first Chapter, on the mechanical structure of fascia, its various important uses, and by contrasting it with other parts of the fibrous system, to show more strikingly that fascia consists essentially of *un*interlaced parallel *unyielding* fibre and *elastic* cellular tissue. Upon this simple and admirable mechanism depends the easy and complete adaptation of fascia to various, and apparently contradictory, uses.

It was intended to have introduced these illustrations in the previous edition, as drawn from the original dissections at the Pavilion of the Ecole de Medicine, in 1820, under magnifying glasses, but unavoidable circumstances prevented This

Magnified Fibrous Tissue.—Plate IV.







M.S.Weaver del.

T.Sinclair's Lith.

was, at the time, a subject of regret, and it is now a subject of greater regret, that in presenting them to the class in this second edition, the author, by being deprived of the opportunity of confirming the original dissections, has been forced to depend on his memory and the text in directing the lithography.

A doubt exists, therefore, on his mind as to the accuracy of the interlaced tissues of the sclerotica. He hopes, however, that the object of illustrating the text has been attained, and that the class will attribute any want of accurary which their future anatomical examination may detect to the above circumstance.

B

The author, as far back as 1819, was deeply impressed with the fact, that the fibrous system has not been made a special and immediate object of dissection, and more particularly that portion of this system which is termed fascia. Like the cellular tissue, it has been considered in the anatomical room, so to speak, as waste-stuff, to be removed in the display of the muscles, veins,

nerves, and viscera. To understand its mechanism and expose its entire disposition throughout the animal economy became an object of investigation whilst enjoying the anatomical advantages at the Pavilion of the Ecole de Medicine; but circumstances hastened his departure from Paris, and never since has an opportunity been afforded of prosecuting his design beyond that displayed in the anatomy of the groin, together with the fascia of the pelvis, and the axilla and fibrous sheath of muscles, which have not yet been published. He has been gratified, however, to find that this field of anatomical research has been entered by others, and that excellent exhibitions of much of the system have been subsequently displayed in MM. Bourjery and Jacob's Descriptive and Physiological Anatomy.

C

The investigation of the fascial structure naturally divides itself into five parts, viz.—1st, that of ascertaining the mechanism of the tissue; 2d, that of tracing its disposition throughout the various structures in all the classes of the animal kingdom; 3d, that of examining vegetable organi-

zation for an analogous structure; 4th, that of obtaining any vestige of it in crystalline matter; 5th, that of deducing from the whole field of facts the laws of the fibrous system.

D

It was not long after the author had entered upon the investigation in question, that he perceived the intimate connexion which exists between the system under consideration and the cellular tissue, and that it is but a modification of this universal tissue, made by the *addition of parallel unyielding shining fibres*. It was under this view that he perceived the intimate structure of fascia; and was enabled to form the definition that has been presented in the first Chapter, viz. that it consists of unyielding shining fibres, traversing in parallel lines, more or less closely, and in one or more strata, the ubiquitous elastic cellular tissue.

E

Fascia, then, consists of two elements of opposite properties, viz. *the unyielding shining fibres, and the elastic cellular tissue.* The former gives

strength to the structure, enabling it to firmly hold together parts which, without it, by their natural action, would be injuriously parted; and also, at the same time, to keep them in due approximation. It presents also a *surface of resistance* from which to reflect, in proper directions, the movements created by muscular contraction. The latter, *the cellular tissue*, being the surface on which the capillary system is spread, and thereby the *medium* of conveyance of the *vital fluid* to all animal structure, sustains the *vitality* of these unyielding fibres; and at the same time, by its possessing an elastic property, (a property so marked in the cellular tissue, that this deserves to be called the elastic tissue,) it endues the fascial structure with an *elastic property*, which, by the peculiarities of its unyielding fibres, is not interfered with. Fascia thus, *by its fibres*, has firmness, and by *its cellular tissue*, has motion—two opposite properties of great importance in all structure.

F

A knowledge of fascia implies that of the properties and disposition of the cellular tissue. This also, therefore, must be made by the student

of anatomy, a special and immediate object of dissection. The investigation will become exceedingly interesting, resulting in a synthetical knowledge of animal mechanism. The analysis of muscles, veins, nerves, and viscera, which constitutes the ordinary labour of practical anatomy, leaves the mind in a very desultory and unsatisfactory state: whilst tracing out, as a separate and distinct task, the entire disposition, and also ascertaining all the properties and uses of that neglected cellular tissue which is cast, as waste-stuff, from the forceps of the dissector, will enable the mind to perceive the parts, which have been analysed, restored to their unity of structure by a common bond of union. And not only will it be found, that muscle, vessel, nerve, viscera, and other animal structure is appropriately lodged in the common mould of cellular tissue, but also that it enters as an element into each of said structures: that the serous membrane, arachnoid, pleura, and peritoneum; the mucous tubes, surfaces and sacs; the synovial sacs; the fasiculi of muscles, the lining membrane of the cavities of the heart, and of the arteries, veins, and absorbents, are all united by it to the organs they serve.

Is not this ubiquitous cellular tissue the medium which conveys the vital fluid to each part for its nourishment, its support and growth? may it not be a medium of sympathy, metastasis, and magnetic fluid? And is it not the destroyer of the momentum of the heart, to prevent pulsation everywhere throughout the delicate tissues of the body?—acting thus against an internal momentum as the cancellous structure of bone does against all the external momenta.

It possesses the properties of dilatation and contraction, which most likely serves as an expulsive power to the pulmonary air cell, and enables it to serve each organ in all their various motions and modifications of size and shape, as is evident in the diastoles and systoles of the heart, the motions of the brain, the distension and contraction of the stomach and intestines, and more admirable than in all else, the enormous change in the size of the uterus slowly through a period of nine months in in gestation, and quickly in labour in about as many hours.

G

A knowledge of the cellular tissue is important in pathology. Andral and others are satisfying

medical men that animal tissues are not thickened and hardened, but rendered friable and softened by acute inflammations. And that the morbid thickness and hardening is a subsequent process effected in the interstitial cellular tissue, and that hence arise incurable ulcers, permanent stricture, chronic disorders, and anormal pulsation.

H

There may be exceptions to the position that cellular tissue is an element of every tissue. Pathological facts give good grounds of belief that it exists in the substance of the brain, but where is the direct anatomical evidence of it? and of its existence in the derm, and in several parts of the fibrous tissue,—the sclerotica, for example, as exhibited, in Plate IV.? Other illustrations there, however, demonstrate its undoubted existence in fascia, and shows also its various uses. In the fascia iliaca, for example, it abounds, preserving even its laminated arrangements, and its interposed lobes of fat. In the fascia transversalis as exhibited in Plate III. under the letters m m, it appears an unlaminated membrane,

abounding in the inelastic tissue below, and being destitute of it above, and by this very arrangement giving not only firmness but elasticity to the abdominal parietes at the groin, supporting its lower fibrous portion by its broad thin expansion above, as the long, attenuated, unattached, floating, and elastic line of the field spider suspends this insect in the air. In the fascia lata the inelastic parallel fibres are represented more abundantly and in diagonal strata, so that the interposed cellular tissue has been altogether a subordinate element of the structure. The fascia lata is thereby possessed of the two opposite properties of firmness and elasticity. It is by their combined operation that fascia presents a surface of varying degrees of resistance to muscular action.

The drawing which represents the unyielding parallel fibres reflected from the fascia to unite and become changed to the thread-like prolongations of the derm of the sole of the foot, show the fibres so closely in contact with each other, as almost to exclude the elastic and nutritive cellular tissue. This constituent, however, is more sufficiently evident in the drawing which represents the ligamentous disposition of fascia

and also in that exhibiting the strata of the fascia lata. By means of this elastic constitutent the pubal ligament of the fascia lata is enabled to vary the tightness of the twist of the fibres, and thereby to contract and dilate with the motions of the abdominal parietes.

There are several specimens of the ligamentous disposition of fascia to be met with in the body. None of them, however, are of so much importance as that above referred to. It exhibits the twist which the fascia lata makes in attaching itself ligamentously to the pubis; and hence results that FREE INNER EDGE, which is the ACTUAL SEAT of stricture of the bowel in strangulated crural hernia. It thus demonstrates THAT THE SEAT OF CRURAL HERNIA IS NOT MADE BY EITHER POUPART'S OR GIMBERNAT'S LIGAMENTS WHICH BELONG TO THE TENDON OF THE EXTERIOR OBLIQUE MUSCLES, nor by the CRESCENTIC EDGE OF THE FASCIA LATA, as supposed by Hey, but by the FREE INNER EDGE OF THE LIGAMENTOUS PROCESS OF SAID FASCIA.